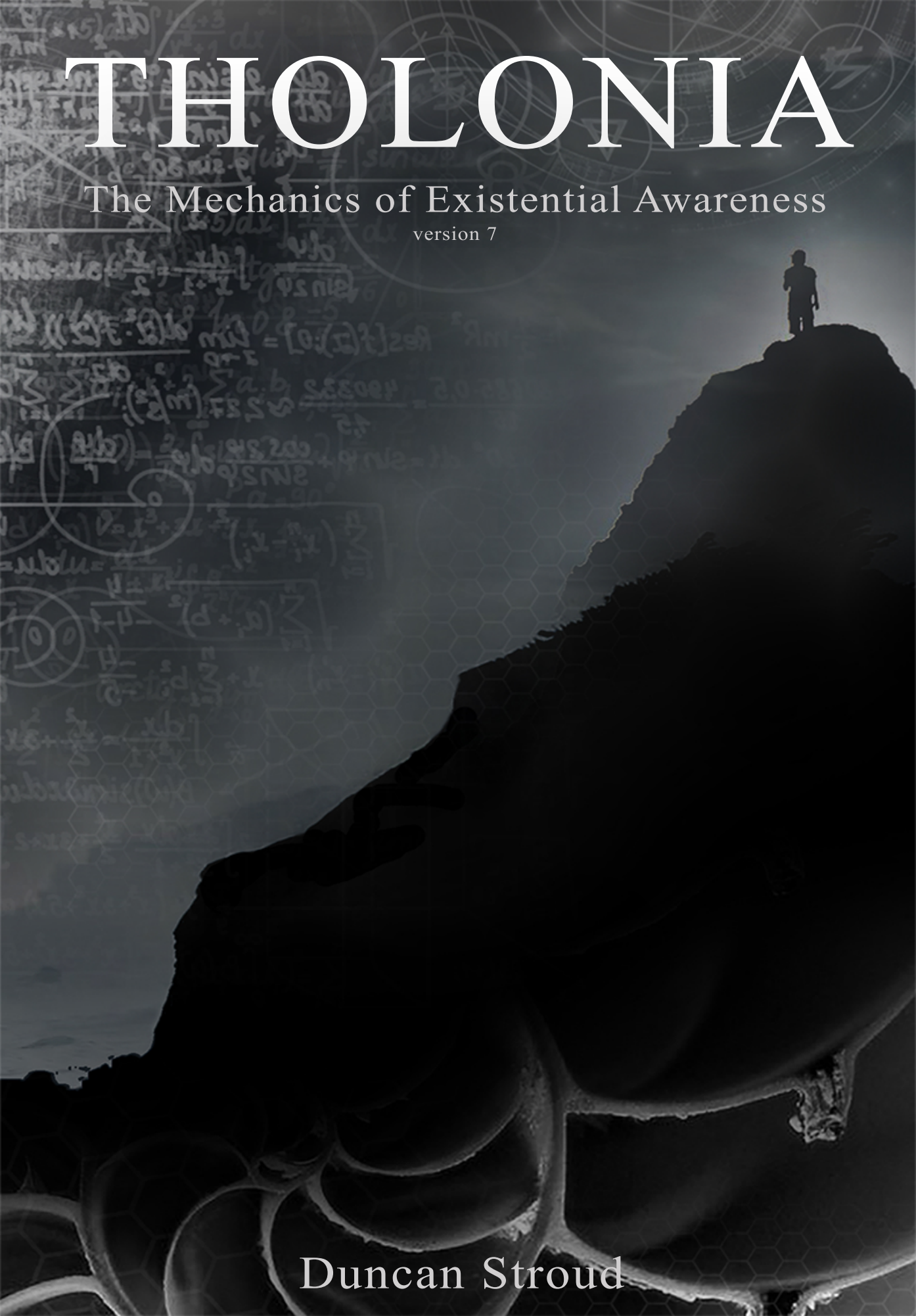
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Introduction

The concept that our reality is an illusion, a matrix, a simulation, or a dream is not new. From the earliest creation stories to our modern version of the Simulation Hypothesis, the story has always been the same: something appeared out of nothing. The details are left to our imagination, and there are countless perspectives on what this means for the meaning and purpose of life.

This book does not attempt to answer any of these questions. Instead, it presents a **blueprint of creation**, similar to a **blueprint of a house**. A **blueprint only speaks to how a house is built**, not what happens inside the house, how it will be used, or who did the actual building.

The ideas and conclusions put forth in this book apply to society and culture, as well as science, politics, economics, self-realization, consciousness, and life itself. I have attempted to avoid social and cultural biases as much as possible, and where they do exist, I have kept them to a minimum. The overarching concept being presented is the idea that the **mechanics of existence and reality**, from atoms to cultures to galaxies, all follow the same laws and have the same **structure as it applies to their context**.

This book is the result of years of investigation, research, and testing, most of which would be considered unorthodox, and little of which would be considered strictly scientific by today's standards, but all of which is transparently reasonable. The book itself is part of that research, as it an attempt to integrate a collection of hypotheses, proofs, speculations, assumptions, deductions, and questions, all of which could benefit from corrections, improvements, tests, and general finessing from the community at large.

The conclusions in this book are my own, drawn from connecting the **dots laid out in the following pages**. It is not my intention to promote my conclusions, but rather to use them as examples of how one person has connected these dots. It is these **dots that give clues to the structure of reality and existence**, but as there are

countless dots, there are innumerable perspectives and understandings. How we connect them is a subjective experience, so you may connect these dots differently, or you may not see anything worth connecting at all.

This book is written in the style of an argumentative proposal. Despite its occasional meandering, the progression of concepts presented attempts to maintain continuity with (hopefully) clear points, references, and a (somewhat) logical order of subjects. It is also an exploration into new territory that I am certainly not an expert in. That is why this book is open-sourced; to allow others' insights and knowledge to be integrated with the hope that a clearer picture of the mechanics of existential awareness will continue to evolve and emerge, allowing for corrections and updates.

The book is sectioned into three parts:

- **Part I** introduces the ideas and concepts that form the vocabulary later used to describe the tholonic model presented. These are not esoteric or niche concepts but the most fundamental concepts known to science, such as energy, chaos, order, waves, and Newton's laws. As we review these basic concepts, we also expand on them and build new concepts that will be critical in describing what role awareness plays in the theater of existence, how and why consciousness had to evolve, and the nature of intelligence, be it artificial, human, or otherwise.
- **Part II** brings together the ideas and concepts of Part I either directly or indirectly and examines the structure of reality and our concepts of how it operates, as it is these stuctures that also define the concepts of data, information, knowledge, and understanding.
- **Part III** looks at the application of tholonic concepts, specifically, in how ideas and concepts form our understanding of reality.

There are also a number of appendixes that have interesting and relevant information that did not did not fit into the body of the text.

On a more mundane note…

Please read Appendix A, "About This Book," to understand why this book is written using an unconventional style of punctuation, grammar, and spacing. It also addresses some technical eBook issues that the reader may find distracting.

I hope you enjoy reading this book as much as I enjoyed writing it.

Part I

1: CHAOS

Everything begins and ends in chaos.

Synopsis: *In the fundamental trinity of reality, that of chaos, energy, and order, chaos comes first. By definition, it exists before any thing exists. It is the engine of creation and annihilation and the always-present foundation of all existence. Chaos exists across a spectrum that stretches between the 0 of nothingness and the ∞ of somethingness. This is the 1st duality of creation from which all that ever was, is, or will emerge.*

In the fundamental triad of reality - chaos, energy, and order - chaos comes first. It exists by definition before any objects or things exist. Chaos is the driving force behind creation and destruction and is always present as the foundation of all existence. It exists along a spectrum that ranges from the 0 of nothingness to the infinity of somethingness. This is the first duality of creation from which everything that has ever existed, exists, or will exist emerges."

Keywords: *chaos, randomness, pattern, duality, creation, zero, infinity*

The Oxford English Dictionary gives three definitions of the word *chaos*:

- The formless matter supposed to have existed before the creation of the Universe.
- The formless and disordered state of matter before the creation of the cosmos.
- A state of extreme confusion and disorder.

I am not sure what the difference is between the first two definitions. Regardless, we'll skip over the apparent contradiction of "formless matter" existing before creation… for now.

Some colloquial, older definitions of chaos describe it as matter before there was any energy, but as we now know that matter itself is nothing but energy, that description no longer applies.

There is also the Ancient Greek mythological definition of the word χάος, *Khaos*, referring to the void state preceding the creation of the Universe or cosmos and personified in the Greek creation myths as the god who was "*the first created being, from which came the primeval deities Gaia, Tartarus, Erebus, and Nyx.*"

In physics, chaos is defined as "*The property of a complex system whose behavior is so unpredictable as to appear random, owing to great sensitivity to small changes in conditions*", a. k. a. *The Butterfly Effect*, but as science writer James Gleick points out: [1]

> *No one [of the chaos scientists he interviewed] could quite agree on [a definition of] the word itself, and so instead gives descriptions from a number of practitioners in the field. Those scientists that do have a definition are hardly in agreement, as Philip Holmes defined "chaotic" as "The complicated aperiodic attracting orbits of certain, usually low-dimensional dynamical systems."*

… while Chinese theoretical physicist Bai-Lin Hao describes chaos as "a kind of order without periodicity".

Another term for *chaos* comes from cosmology, and that is the *primal void.*

Modern cosmology's Big Bang theory is quite compatible with this idea that before there was anything, there was nothing but a primal void, a term often used by cosmologists. The primal void is a descriptive synonym for at least one state of chaos.

The primal void has also been called the *gap between heaven and Earth*, the *abyss*, *absolute-limitless nothing*, *ex nihilo*, *primordial waters*, and several other terms, all trying to convey the idea of an immeasurable nothingness, a concept that may well be impossible for the mind to grasp. This nothingness also includes (rather, excludes) the concept of time, as there can be no time in a void of nothingness, at least according to Stephen Hawking. [2]

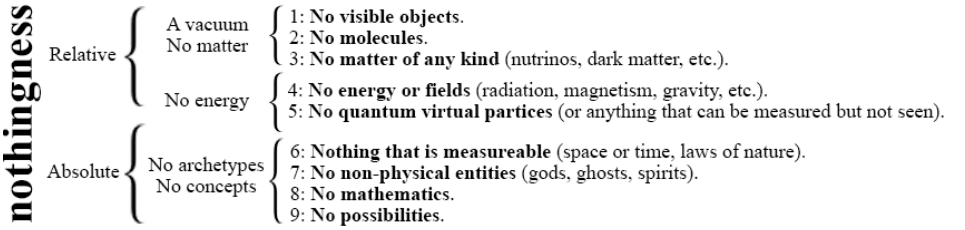
Everyone from scientists to mystics seems to agree on the rather obvious premise that before there was something, there was nothing, and then, presto, somethingness appeared in the nothingness. What that somethingness was is still unsettled. It could have been some form of singularity that may or may not have spontaneously appeared and expanded to create the Universe or some form of energy intense enough to warp space to the point where it became mass or even some type of multidimensional projection. In all these theories, and all beliefs and speculations, there is the understanding that before there was something, there was nothing.

Nothingness

How "big" was this nothingness? Is there a limit to nothingness? If there is, how is that defined? If there is no limit, then is nothingness infinite? These may sound like silly questions, but they are actively being researched and debated in the worlds of science, philosophy, and mathematics [3].

First, we must be clear about what we mean by *nothing* because conceptually, there are numerous types of nothingness (and many types of ∞ as well, possibly infinite).

According to various authorities, there are multiple levels of nothing, but a good overall understanding is provided by physicist *Sabine Hossenfelder*[4], who describes up to 9 levels of nothing. Below, we list these 9 levels, their 3 general categories, and the 2 basics concepts of relative and absolute nothingness that we will use in this book.



What level would "I have nothing in my bank account" be categorized? Having a measurable balance of 0 puts your absolutely empty bank account in Level 6, and being a measure of the non-physical entity of credit puts it in level 7. Although being flat broke may feel like absolute nothingness, finances are a value that is derived from material things and is the transference of energy between things (people, businesses, etc.), and could even be considered a "field", making your poverty a relative form of nothingness.

Relative nothingness is contextual. *Absolute nothingness* has no context because nothing exists to give it context, so there is nothing that can be said about absolute nothingness. Even calling it *absolute nothingness* is limiting, as the concept of *absolute* implies "*to the largest degree possible*", which implies size, measure, and time, none of which exist in *absolute nothingness*, and just adding words like *super-duper-ultra-unlimited* doesn't fix this. Perhaps the only thing that can be said about true nothingness is that there is nothing we can say about it. In this way, primal, true, or absolute nothingness is synonymous with the *Tao* as described by Lao Tzu when he said:

> *The Tao that can be described is not the eternal Tao.*
>
> *The name that can be spoken is not the eternal Name. The nameless is the boundary of Heaven and Earth.*
>
> *The named is the mother of creation.*

Which is to say:

> *The nothingness that can be described is not the eternal Nothingness.*
>
> *The nothing that can be spoken of is not the eternal Nothing. The eternal Nothingness is the boundary of all that can ever be and all that is.*
>
> *Nothing is the mother of creation.*

If there are (at least) 2 kinds of nothingness, does that mean there are (at least) 2 kinds of dualities? Yes. Each of the 9 levels listed exists in some type of duality (except perhaps #9) and has a duality of some sort, but with only 2 types of nothingness, we refer to only 2 types of duality; the *primal Duality*, which is the duality of the first *thing* that existed in the *primal nothingness*, and *relative duality*, which is every duality that exists because of, or within, the *Primal Duality*.

We symbolize this primal duality as 1 and 0; from 1 and 0, all other numbers appear. It might seem more sensible that the primal duality would be that of ∞ and 0, which is also true, as ∞ is a concept representing the totality or unity of all numbers and is not a number itself, while the number 1 *does* represent unity, and is even defined as "unity". In this case, which is limited to the context of *unity*, 1=∞, or rather, the unity of 1 represents the unity of all, and the mapping the range of 0→1 to 0→∞ is common in mathematics and computer programming for exactly this reason.

All the dualities that follow the primal duality exist in the realm of *relative nothingness*. We have names for these relative dualities, such as positive and negative, yin and yang, or any difference that separates *somethingness*. Measurement of any kind is a byproduct of relative nothingness. This *relative duality* is the duality of our reality, the mundane duality that allows *things* to exist, energy to move, and has states of balance and imbalance. In this context, balance refers to the balance *within* movement, and not the balance of stillness. Dancing, electricity, nature, the cosmos, these are all examples of balance within movement.

Just as nothing must precede something, 0 precedes 1, so we can say that everything starts with 0. We will be using the concept of 0 and nothingness quite a bit, so let's review this "simple" and common concept we use daily.

Zero

The general concept of nothingness is represented by the number 0, but it was only recently in human history that we could even grasp the concept of nothingness, and even then, its adoption took thousands of years and was hotly debated. It is officially recognized that 0 was first recorded in Mesopotamia around 3 B.C.. Still, the ancient Indian *Bakshali manuscript* from 1500 B.C. appears to use the symbol of a dot (•) to represent 0. In either case, these were followed by 0's appearance in Mayan Meso-America circa 4 A.D., again in Mayan Meso-America in the 5th century, Cambodia in the 7th century, and China and the Islamic countries in the 8th century. The concept of 0 didn't reach Western Europe until the 12th century, and even then, it was not entirely accepted as a legitimate number concept for hundreds of years, which is a bit embarrassing considering that bees [5], monkeys [6, 7, 8], and crows [9] have no problem with the concept of 0.

Similar to Dr. Elisabeth Kübler-Ross' well-known 5 stages of grief; denial, anger, bargaining, depression, acceptance, the adoption of the number 0, according to animal physiologist Andreas Nieder, went through its own 4 stages [10], which seems appropriate as the concept of nothing, on an existential level, it not unlike death.

- **Stage 1:** Recognition of the absence of something.
- **Stage 2:** Recognition of nothing vs. something (5th c. BC, Greece).
- **Stage 3:** Recognition of 0 preceding 1 (7th c. AD, India).
- **Stage 4:** Ability to assign rules and properties to a symbolic representations (13th c. AD, North Africa).

Note: these dates are best-guess estimates based on documented references.

Curiously, humans achieved such an advanced state of intelligence yet never developed the concept of 0. It's almost as if humans were gifted the benefits of intelligence via genetic mutation, alien intervention[11], or psychoactive stimulation[12], thereby skipping a critical phase of the long, hard, slow work of evolution to get there.

It is not a coincidence that the modern world and the concept of 0 arrived simultaneously, as it was 0 that allowed for the creation of things like modern math and calculus. This ability of 0 began to eclipse the philosophical objections that you can't get something from nothing, much to the chagrin of the Christian church, which was not very happy that this handy number was being introduced by the Muslims, not to mention that if something can come from nothing, what does that say about god? [13].

The Complexity of Nothing

0 is challenging enough without the added confusion that comes from the clearly ridiculous yet mathematically correct answer to $0^0=1$ that many calculators provide (including Google's calculator. The more realistic answer is $0^0=undefined$). However, X^0 is always 0 as long as X!=0. Although this may look like math mumbo-jumbo, it's pretty straight forward: $X^0=X^{1-1}=\frac{X^1}{X^1}=\frac{X}{X}=1$. In addition to 0 representing nothing, this proof shows us how 0 also represents a state of nothing that *results from something*, as 1-1=0, or conceptually speaking, *something-something=nothing*. Hence, 0 is not only the "womb" from which all numbers emerge but also where numbers go when they disappear from context.

I wonder if this is what Lao Tzu was also referring to in the *Tao Te Ching* when he said:

> *Yet mystery and reality emerge from the same source. This source is called darkness. Darkness born from darkness. The beginning of all understanding.*

Which is to say (in this case):

> *Yet the unknown and the known emerge from the same source. This source is called nothingness. Somethingness born from nothingness. The beginning of all understanding.*

This single number of 0 represents the antithesis of all other numbers, just as the idea that all that ever did, does, or will exist, does so because of the zen-like oxymoronic paradox of the "existence of nothingness". Countless conjectures and proofs have been written on 0; that it is equal to 1, or to the sum of all numbers, or to ∞, or $\frac{1}{\infty}$ and many other, or even all, values. This is not hyperbole, as these concepts are hotly debated in mathematics and philosophy. On its surface, the statement 0=∞ looks like a senseless statement because 0 is a number but ∞ is a concept, so they can't ever be equal. However, 0 is both a concept *and* a number, as it has a *quantitative* value of 0 and a *qualitative* value of *nothingness*. This is similar to how the number 1 has a *quantitative* value of 1 and a *qualitative* value of *unity*. Of course, all numbers are concepts, and most common numbers have well-known qualitative, but the first pair of *nothingness* and *unity* started it all. It's worth noting that Parmenides, Leibniz, and other giants in the history of math equate *unity* with ∞ with the argument along the lines of all that *is* collectively defines the unity of existence; hence, the concept of 1=∞, which leads to concepts like $\frac{1}{\infty}$=1∴1-∞=0∴∞-1=0∴0+1=∞, etc., etc. While these concepts may not work so well quantitatively as when balancing your budget, they are fundamental qualitative concepts that have been examined by great minds, from Heraclitus to Hegel.

The truth is, or rather *a* truth is, the numbers 0 and 1 are remarkably flexible as they are two concepts that encapsulate the idea of the nothing of nothingness and the totality of somethingness; the two poles that define the arena or spectrum wherein all things exist. What happens inside this arena? In a word: *order*. There is no order in the *nothing of nothingness* for there is nothing to order, and there is no order in the totality of somethingness as there is no form, structure, sequence, etc. If 0 is the mathematical concept of nothingness, then 1 is the ultimate mathematical black hole, and in that sense, 1 *does* represent ∞. 0 and 1 (or 0 and ∞ if you prefer) are two states of chaos. Order only exists *between* these 2 states, and our understanding, discovery, and invention of order allow us to know this.

Key 1: chaos is a state lacking any order, time, or energy; total nothingness; 0.

Key 2: chaos is a state of total energy and matter; total somethingness; ∞

Order and the chaos of 0 and ∞

It was Newton's contemplation of $\frac{0}{0}$ that led to his invention of calculus, and while we are taught that equations with 0 or ∞ are problematic and best to stay away from, calculus can prove that ∞^{∞}, 1^{∞}, 0^{0}, $\frac{\infty}{\infty}$, 0×∞, ∞-∞ all equal $\frac{0}{0}$, and yet, even today, we are not sure what $\frac{0}{0}$ actually is. We can see evidence of this in current research, such as the research of the Chief Editor of the publication *Causation*, Ilija Barukčić, titled *"Zero Divided by Zero Equals One"* [14], which starts with:

> *Objective: Accumulating evidence **indicates** that zero divided by zero equals 1*

And concludes with:

> *Conclusion: The findings of this study **suggest** that zero divided by zero equals one.*

Or, in a paper co-authored by Ilija Barukčić that appeared in *Journal of Applied Mathematics and Physics* [15]:

> *A solution of the philosophically, logically, mathematically and physically far reaching problem of the division of zero by zero (0/0) is still not in sight.*

In addition to this ambiguity, not only can 0 = ∞, it can equal any number. That is actually a true math statement (I didn't just make it up). In math, when an answer can be many values, it is called an *indeterminate* answer, meaning an equation, like $\frac{0}{0}$, has no single or fixed value that can be determined (even though it looks likes the answer should be 1). The same can be said for $\frac{\infty}{\infty}$, $\frac{\infty}{0}$, $0\times\infty$, 0^0, ∞^0, 1^∞, ∞=∞, as they are all *indeterminate*. Indeterminism is the equivalent of mathematical chaos, which supports our claim that 0 and ∞ are qualitative representations of chaos. They are also the only numbers that represent a concept that has no value; 0 being the explicit lack of any value, and ∞ which is a concept that represents the opposite of 0 and yet can have many different forms. In general, and how it is used in this book, ∞ is meant as a frame for all positive numbers, as in *0 < positive_numbers < ∞.*

While the above is a mathematical argument for why 0 and ∞ represent states of chaos, we can also use the current definitions of chaos to make the same argument. While we can say that nothingness has no order or periodicity and is therefore chaotic, *chaos* also has another definition that means precisely the opposite, similar to the ∞=*0* concept. Take, for example, the study of chaos in the origins of the Universe that was undertaken by Chicago's Northwestern University physicist Adilson Motter, who concluded that 10^{-36} seconds after the Big Bang happened; there was a state of *total chaos*. Do you know what was happening at 10^{-36} seconds after the Big Bang? Everything, and in a temperature of over 1 trillion degrees. Motter concluded from his study: [16]

We are not claiming here that the Big Bang theory is correct, but we are asking the question; How can the concept of *chaos* describe the state of the void of total nothingness as well as the state of all matter and energy in the Universe, total somethingness?

The definition of chaos that works for both is *"the degree that order is present in any state"*. Both extreme states of total nothingness and total somethingness have no order, pattern, or periodicity, which is quite compatible with another common definition of *chaos* as synonymous with *unpredictability*. A more flexible definition of *chaos* comes from the authors of "*Introduction to Complex Systems, Sustainability, and Innovations*", [17], which simply states:

> *chaos explores the transitions between order and disorder. An order arises from the ever growing disorder of the Universe - chaos and order together.*

But this is still too vague for our purposes because it is more reasonable to consider *chaos* as a spectrum from 0 to ∞. More correctly, the spectrum of *chaos* is the inverse of the spectrum of *order* (which is further defined later on), because just as there is no such *thing* as darkness, only a lack of the *thing* that is is light, chaos is the lack of order. For this reason, we initially define using a slightly inaccurate definition shown below. However, we will be refining this concept as we continue.

Key 3: chaos as a measure of pattern, order, and predictability.

Chaos is not the same as randomness. A random event is *non-deterministic*, meaning it can't be determined when it will happen because it has no pattern, rule, or reason (that we can discover) and no known immediate cause. At least, that is how we define the word as it is used in this book. It may be the case that the concept of randomness simply exists to label unexplainable events that are actually chaotic in nature but far beyond our current abilities to understand, like a super-chaotic event. An example of this is from the website RANDOM.ORG, which generates random numbers. In order to make them more truly random, they use atmospheric noise as an input. That ambient noise is not random but is chaotic. Another example is how computer random number generators use electrical noise and heat as inputs to their number generator. Again, these are chaotic inputs.

Another way to understand the difference between randomness and chaos is in the value of π (pi). The value of π is infinite in numbers and the sequence of those numbers is quite predictable using simple math, which is how we can calculate the value of π, but there is no pattern to the numbers, so there is no way to determine the following number based on the previous numbers. This is similar to how prime numbers can only be calculated as they have no pattern. This makes the value of π chaotic because the value is deterministic yet produces a series of numbers that appear random and uniformly distributed (a.k.a. *normal* distribution). We say "appear" because there is no way to prove that π is random or *normal*, just as there is no way to prove that the infinite numerical sequence contains every possible combination of numbers that can ever exist, but evidence suggests that's *probably* the case[18]. So, chaos has a pattern, but it is unpredictable, and **randomness has no pattern and therefore contains *every* pattern**. Here we see an instance of the concept of not only 0=∞, but that ∞ exist *within* 0.

> *There's a beauty to Pi that keeps us looking at it… the digits of Pi are extremely random. They have no pattern, and in mathematics that's really the same as saying they have every pattern."* ***~Jonathan Borwein, mathematician***

Depending on who you ask, you can get a number of different definitions of "random", but the definition we will be referring to is:

Key 4: A random event is a spontaneous event with no apparent cause.

Of course, this leaves a lot of room for speculation as to the randomness of an event, as there are undoubtedly many cases where we just can't see the cause. What appears as random could easily be related to the *butterfly effect*, which states that small changes can have a growing and cascading effect. This idea is often exemplified in the question, "*Does the flap of a butterfly's wings in Brazil set off a tornado in Texas?*" which was also the title of a 1972 talk[19] given by Edward Norton Lorenz, a mathematician, meteorologist, and founder of chaos theory.

While this is a bit of an aside, it is a fascinating piece of history and an excellent example of the *butterfly effect* in so far as how it can affect society and how a candid meeting of two strangers in a ball in Prague in 1896 would be responsible for World War I and World War II.

Sophie Chotek

The two strangers were Arch Duke Franz Ferdinand and Sophie Chotek, a duchess and the daughter of a Bohemian Count, who met, fell in love, and got married. The problem was Sophia, being a mere duchess was not royalty, and given royalty's strict adherence to their self-aggrandizing customs, it was forbidden that she appear next to the Archbishop in any official royal ceremonies. The Arch Duke may have loved Sophie, but he was still an obedient autocrat, and so he followed the rules. However, this meant he *was* allowed to have her by his side during non-royal ceremonies, such as when he was acting as the Inspector-General of the Austria-Hungarian Army. Taking advantage of this loophole, he decided to show off his wife to the world by taking a public trip to inspect the Bosnian army with his wife by his side. To ensure everyone saw them together, they traveled in an open car for all to see. It was during this public demonstration of his undying love that the Serbian nationalist, Gavrilo Princip, ran up to the car and shot both of them at point-blank range, killing them instantly.

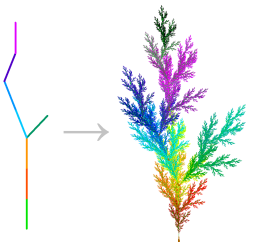
Austria was outraged, demanding an apology from Serbia. Serbia, while denouncing the assassinations, refused to apologize, stating they had nothing to do with the plot. Austria responded by declaring war on Serbia, which forced treaty-bound Russia to ally with Serbia. Germany, who was treaty-bound to Austria, declared war on Russia, causing France and Great Britain to come to Russia's aid. World War I devastated Germany, which laid the fertile ground for the rise of nationalism and Hitler, which resulted in World War II.

All of the death and destruction of these wars was a consequence of a chance meeting at a ball, plus countless other *butterfly effects*, such as Gavrilo stopping to buy a sandwich which happened to place him at the right time and place, and every other interaction that has ever taken place since the First Cause started the show. But such stories are deceptive because they take away from the inconceivably profound realization that every trivial act is also a result of everything that has happened since the beginning of time. Yes, it's quite possible that WWI would have occurred in any case, but in this timeline of history, this is what *did* happen, just as you may not have spilled your drink if you hadn't turned your head because you heard a weird sound, but you

did because everything that has ever happened since the beginning of time was leading up to that moment. This may sound like there is no such thing as “free will,” but we won’t get into that now as it is addressed towards the end of the book.

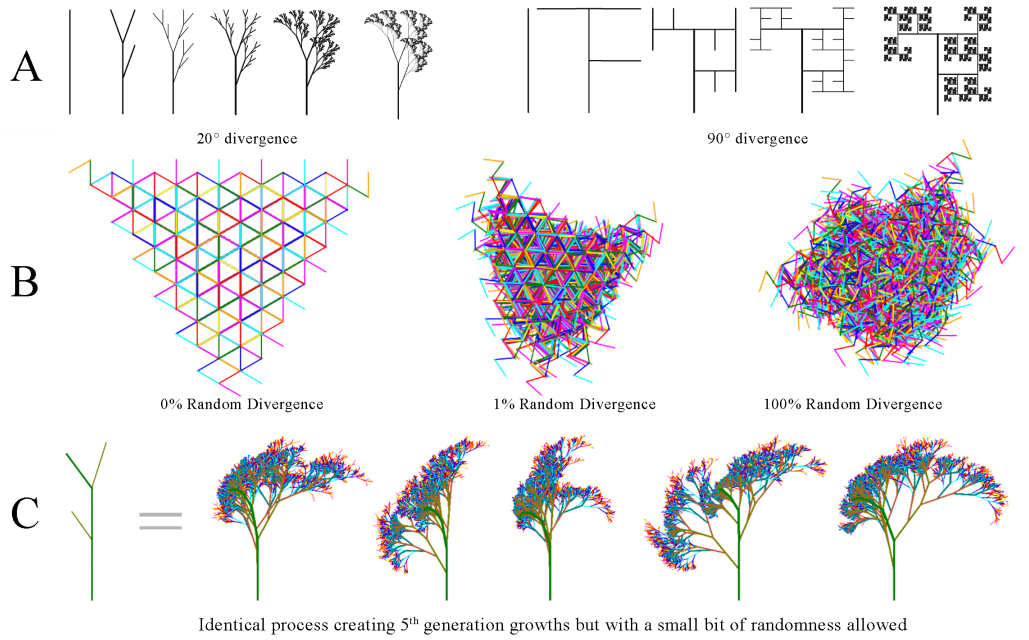
One of the classic “truly random” events in the Universe is radioactive decay, but only the decay of a single atom. As a group, the decay is entirely predictable, which is how we calculate half-lives of radioactive material. This is the same as saying we know that there is a 1 in 366 chance of getting into a car accident on a 1,000-mile car trip, but it is impossible to predict the who, when, or where of any one particular accident. Insurance companies try to minimize the odds with reams of data on the probabilities of accidents regarding teen drivers, aggressive drivers, weather, speeding, impaired driving, driver error, distracted driving, etc., which narrows the range but still can’t predict one accident. Still, this does not make individual accidents random. Suppose Sally gets drunk because she just got fired for aggressive behavior, and she decides to drive home from the bar in a snowstorm while arguing with her husband on the cell phone and going 30 miles an hour over the speed limit, and she gets into an accident with Bob. In that case, there is nothing random about that, nor is there anything random about how Bob’s car was where it was when it got hit. Both Sally and Bob were on a path resulting from a series of chaotic events (i.e., life). Each event increased or decreased the probability of an accident. In Sally’s case, those events clearly created a high probability scenario for an accident. Bob, on the other hand, being a careful driver who was paying attention and was going slow, had a very low probability of an accident, yet he got hit anyway. We would say this was a random event (“bad luck”) for Bob but a highly predictable event for Sally. In this scenario, “random” means an unpredictable yet deterministic chaotic system (Bob’s life) that influenced another unpredictable yet deterministic chaotic system (Sally’s life). Because neither system is predictable, it is impossible to predict when or if they will interact; thus, “random” is often synonymous with “theoretically unpredictable,” as this random accident was the effect of a cause created by the intersection of 2 chaotic systems.

A more common example of this is the idea of a stock market. The price of a stock is unpredictable, but it is not truly random, as the price is determined by the individual actions of thousands of buyers and sellers, each making non-random decisions based on their financial interests. Each of these cause/effect chains is a system in and of itself, and all these systems combined form the larger system of a stock market.



Chaos is *deterministic* because it adheres to rules and even has a pattern, but the effects over time create unpredictable results. Chaos does not happen in one moment. It happens over time, and what happens next depends on what happened before, making chaos a self-similar or self-referencing process. Because it is *change* that happens over time, there are two components to consider; a *growth factor* and a *limiting factor*. For example, in the image to the right, we start with a simple pattern that never changes but can replicate itself in its children, and after 10 generations, it turns into a tree. The *growth factor* is self-generating, and the *limiting factor* is that all of the variables (length, angle, color) are permanently fixed. Popular real-world chaotic systems are things like the weather, economics, growth patterns, etc.. Still, in actuality, everything that grows, moves, or has energy moving through it, has elements of chaos in its system that are influenced by millions of variables forever changing.

Below are some diagrams to help make this concept clearer.



Row A: The top-left shows the changes to a simple form where a line half the length extends from its parent line at 20°. This newly extended line will then also have a line half its length extending from it, and so on. The top-right image is the same pattern, but with 90° instead of 20°. They are side-by-side to show how the natural form of plants is the same pattern as a now-common man-made grid pattern. Why is that significant? Because this grid pattern was adopted as a way to grow and expand new territory more efficiently, which is why the architects of the New World adopted it in the 1700s. Thomas Jefferson first used this pattern to "gridify" the entire country to make it easier to expand into. City planners found the same pattern far more effective than the more organically formed cities of old Europe. The major driving force behind this pattern was financial, of course, and it's no surprise that this efficient form of development appeared and grew in parallel with the industrial revolution and the radical expansion of city populations, such as London, which grew 600% from 1775 to 1885. We see this same evolution of patterns in biology, such as grid cells, which are the cells that allow us to navigate our environment and which form a triangular grid with their impulses. It may seem like a stretch to claim that the industrial revolution, capitalism, and suburban roads are just another instance of the same patterns that determine tissue growth and the stripes of a Zebra Fish, but that is precisely the case[20]. The only difference is the context in which these patterns are being applied and the resources at hand.

Row B: The middle row shows the simplest of all forms, the triangle. In this case, a new line is always created at the end of the previous line but rotated left 120°. At the end of that child line, a new parent line is created but rotated in the opposite direction (whose child will also rotate right, and so on). In the left image, all variables remain the same. In the middle image, the deviation was allowed to wander 1° in either direction. In the right image, the deviation was allowed to wander in any direction. These images represent the three states of order; perfect and unchanging, transitioning, and total chaos.

This is also an example of an instance of a relative duality. While the prime duality is that of primal nothingness and primal somethingness, a relative duality is that of a relative nothingness and a relative somethingness. In this case, the relative somethingness is the lines formed by the rule, and the relative nothingness is where there are no lines. Together they create a perfect form (according to the rules); in other words, an archetype. It is perfect because the rules are perfect. When we add a tiny bit of imperfection of 1° (or 0.27%) of randomness, the form is no longer perfect but still identifiable. With 100% of randomness, it is total chaos, a perfect mess. This is an example of the path from order to one type of chaos (the path from chaos to order is addressed in the chapter on energy).

Row C: Because chaos is deterministic (but appears random), whatever a chaotic system does, it will do exactly the same way every time if all the variables remain the same. In our world, these variables are dynamic, so there will always be some changes to some variables. This is why all pine trees don't look identical. The row shows five instances of the 5th generation of the same source pattern where slight variations in length and divergence were allowed. This is meant to demonstrate that while growth is a chaotic system, evolution is a chaotic system with some amount of randomness in it, for without those slight variations, nothing would ever change. Reality expands in chaos but evolves in randomness. At least, that is the premise we start from because random events can exist within the chaos of change, but the chaos of change can not exist in a random event, and the Universe is certainly a system of change.

When looking at these images, remember that these are only 2-dimensional patterns of 10 or fewer generations from their starting point, with only length and divergence changing slightly. In the 3-dimensional world we live in, the starting point from which all form descends is the beginning of existence. The variables and generations at any and every moment since the beginning of time are countless, and the change in the variables range from minuscule to dramatic. The impossibility of accounting for all the details necessary to make a prediction of a chaotic system is why it is unpredictable.

2: ENERGY

Nothing exists without energy. Everything exists within the laws of energy.

Synopsis: *Nothing exists without energy, as everything is an expression of energy. This includes thoughts, archetypes, ideas, concepts, etc. Energy creates patterns, which create archetypes, which create form. Form and archetype are instances of the same expression in different contexts. Our understanding of energy (and all things) is limited by our ability to perceive and understand.*

Keywords: *energy, archetypes, reality, material*

The topic of energy will be reviewed many times further on, but at this stage, it's only necessary to point out two types of energy; *kinetic* energy, which is the energy capable of causing change to a system as a result of movement, such as water passing through a turbine in a dam, and *potential* energy, which is the energy that is not moving but is available, such as all the water in the dam that is not yet passing through the turbine.

Science, mythology, and religion each have their own stories and theories, and, not surprisingly, many of these theories are not that conceptually far apart from each other. One thing we can say about the energy that created this Universe (if we are to believe the first law of thermodynamics that states energy cannot be destroyed or created) is that it existed before the Universe was created. Where the primal energy came from that created our Universe is still, and will probably remain, unanswered, at least by modern science.

For our purpose, at least at this moment, the details of these theories or stories don't matter. What does matter is the general idea that once energy was introduced into the chaos of the void, something happened. That "something" was some sort of movement, as that is the undebatable nature of energy; it's always moving. This energy moves in accordance with certain laws and in the context of a duality. This duality can be of somethingness/nothingness, 1/0, any polarity, or any difference between 2 things that can potentially interact.

Key 5: Everything exists in a state of duality.

The question then becomes, did these laws exist before creation? Did they exist in the chaotic primal void of nothingness? Well, the reasonable answer is yes… and no. "No", they did not exist in the primal void because these laws only apply where time and space exist, neither of which existed prior to the introduction of energy. "Yes", in that these laws must have existed "in theory"… e.g., the relation of a circle's circumference to its radius existed as the constant *pi* (π), or the relationship between a circle and a square is an infinite regression, but as there were no circles or squares it was

not measurable… there was no *instance* of *pi* (π), but there was, for lack of a better word, an *archetype* of those relationships. In this context, we are using the traditional and current definition of the word *archetype* as per the Oxford English Dictionary:

> *The most typical or perfect example of a particular kind of person or thing*

The only place where the potential for anything to exist, including concepts, ideas, or archetypes, is in a place where something *can* exist; a place where somethingness *coexists* with nothingness. 0 can exist, and ∞ can exist, but unless they commingle, there will never be numbers (or anything else). When they do mix, numbers appear, and with them, these archetypal laws, such as πr^2 and $1+1=2$, become instantiated in reality. "But!" you may be thinking, "If archetypes can only exist in a duality, and there was no duality before *somethingness* appeared in *nothingness*, how could the archetypes have existed?" Well, they couldn't, which suggests that there was a pre-existing duality that our current reality emerged from wherein these archetypes and laws already existed. Perhaps that preexisting duality is a "sea" of infinite "waves" of uninstantiated possibilities forever crashing upon the shores of matter? This poetic description also applies to what quantum mechanics calls the *wave functions* that represent all potential instances, but until one of those waves *collapses* into a material form, it will remain in the duality of lonely archetypes.

In quantum physics, the only waves that will ever reach the shores of form are those that have the highest probability of doing so. The realization that that which is most likely to happen will probably happen is not the profound part of this quantum insight. The profound part is the realization that reality is a multidimensional cosmic casino. We don't know where an electron exists. We only know the probability of where we might find an electron. The probability field of an electron in your finger stretches out to the end of the Universe, but the odds of finding one of your finger's electrons on Zeta Reticuli 39.3 light years away is as likely as hitting the winning number on a roulette wheel with 10^{82} numbers (that's a roulette wheel 10^{76} light-years wide in diameter which would take 10^{60} years to spin just once if it was spinning at the speed of light - yes, this is a very silly, but interesting detail). Your finger's electron is likely to be found where it is right now; in your finger, but there's a *chance* it *could* appear on Zeta Reticuli, and for all you know, some of your electrons are there right now! But even that's not the most mind-blowing part because if an electron is actually a wave that is described by a potential field, and that field extends to the end of the Universe, then that electron is as big as the Universe, that is, until it collapses into a femtometer-sized dot (that's 10^{-15} of a meter, or 0.000000000000001 m). Every electron's field in your body, and everything else, extends to every corner of existence… at least in the archetypal realm of laws that our reality exists within and to the best of our ability to understand those laws.

Modern Concept, Ancient History

Without getting too much into philosophy here, the idea of archetypal forms is a very Platonic idea. Plato's *Theory of ideas* is the hypothesis that everything that exists is a material instance of an ideal version, or perfect idea, of that thing.

It is also a very Kant-ish idea and a very Locke-ish, Descartes-ish, and Hume-ish idea, for all these great thinkers, plus many more, had the understanding in one form or another that *things* were primarily *ideas* or *concepts* first. Not all philosophers and scientists-of-old agreed, and in the good ol' days, the debate usually boiled down to some form of "is there a god?" [21]. Today, science tends to shy away from the concept of a god but asks equally impossible questions, such as "is reality a hologram?" or "is existence a simulation?", etc. That question is answered in this book, but the answer is as maddening as it is enlightening, and words like "yes" or "no" become meaningless.

For pretty much all of man's history, there has been an archetypal, theoretical, spiritual, or mystical concept of a realm of ideas. In this realm, forms, in their unmanifest, uninstantiated state, are simply ideas. The perfect cube, for example, is a concept we all can grasp but whose instances in the material world can only approach. These archetypal forms follow archetypal laws, for if they did not, then the relationship between the area of a circle and its radius could just as well be "elephant toes on Tuesday afternoon", or "cat dog moo".

This concept that unmanifest forms are the same as ideas, existing in a non-physical, non-manifest, non-instantiated state, provides an elegant explanation as to the origin and nature of the laws of physics. Just as physical forms, like the ball and the cube, have their ideal archetypes, the laws of physics and nature also have their archetypal forms.

The laws of a form and the form itself are not separate things; they are the same thing in two different forms of expression. Form itself is simply the result of a function, or by-product, of the law as it is expressed within some material context. The form *is* the instantiation of the law. A circle is defined by its law, $2\pi r$, and what we see as a circle is an instance of this law. Archetypes can also have archetypes, which we might refer to as *meta-archetype* or *meta-type*. For example, the *meta-type* or *meta-archetype* of a circle ($2\pi r$) is the concept of a dot which is a 0-dimensional point.

> **Key 6:** Theories and ideas are archetypes in their own right, but like forms, they also have their archetypes.

Laws are the blueprints of form, and forms are the instances of the blueprint. How do we know that the laws were not derived from the form, rather than the form being derived from the law? This is addressed in more depth further on, but the evidence is that the same laws exist across many forms. One specific archetype, like that of a cube or a sphere, can have many instances, but a cube or a sphere cannot have many archetypes. This puts the laws of form "higher" in the unfolding process of its creation, as the law must exist before the formation or instantiation of the law. This is additionally supported by the idea that the laws themselves are an expression of energy, the ordering force behind all existence, and, therefore, a prerequisite to form, be it archetypal or material.

Key 7: Levels of order begin with energy, which has laws regarding how it interacts with itself, which forms patterns (archetypes), which create things (have material instances).

You may be asking, “OK, but what if Plato and the gang were wrong?”, but this is not a relevant question because that question assumes that we have access to, or can grasp, the “ultimate truth”, if one even exists. Our theories of reality are predictive models based on our understanding and abilities that are valid for the reality we are able to observe.

Key 8: All theories are only valid for a level of awareness, a level of knowledge, the context of both of them, and the limits of their application.

So, even if Plato is “wrong”, which at some level, at some point, in some reality, has to be true, if his ideas form the basis of understanding that allows us to create abstract concepts that can lead to new, testable understandings, then it is “true” until something better, or *more true*, comes along. For the record, Aristotle rejected Plato’s ideas of forms and stated that all things could only come into existence via matter. From the perspective of this book, both can be true, as one deals with the world of archetypes and ideas and the other strictly with materialism. In both cases of *form* and the *laws of form,* there is one concept that simply expresses itself relative to the context of its scope of either ideas or matter.

Although today we tend to think of Plato’s *Theory of Ideas* as an abstraction, Plato was quite clear that this realm was as real as the realm we exist in every day, the difference being, in the material realm, we can never know the true form or idea due to the limitations of material reality. This is the basic theme of Plato’s *Allegory of the Cave,* which describes this reality as limited since material form is no more than a mere shadow and echo of the true reality (of ideas and archetypes). Parmenides (~500 B.C.) also had the idea that the observable reality was a by-product of an underlying, hidden reality made up of an interconnected invisible network of the smallest possible things that can exist, a concept that was later adopted by Democritus (~400 B.C) when he coined the word “atom”. These ancient ideas live on in modern theories that describe *massless matter* and suggest that matter itself can spontaneously come into existence out of nothing as a result of energy and order.

Key 9: Every thing that exists is an instance of archetypes.

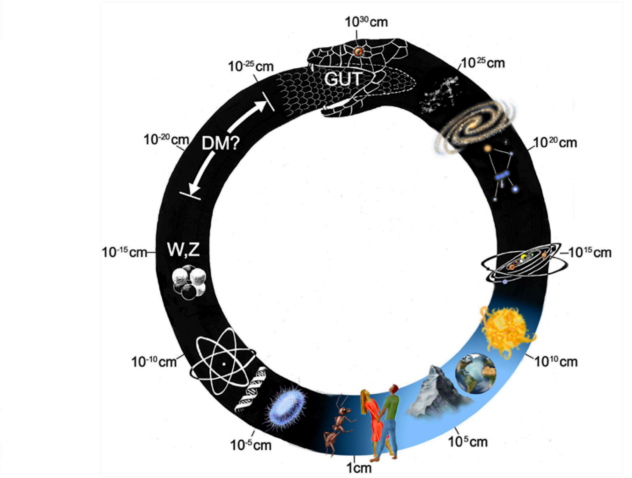
Archetypes of form and the laws of those archetypes are the same things. What we call archetypes of form are the results of these laws. What we see in our reality are the instantiations of those archetypes. Before exploring the subject of energy, we must first explore the subject of *order*, as they are inextricably bound to each other.

3: ORDER

On every scale of existence, order arises out of chaos and then returns to chaos. Each cycle of existence can take millennia or nanoseconds.

Synopsis: *Introduction of Tholonic Model, a model of reality built on both new and well-established concepts. All that exists between 0 and ∞ is an expression of energy. Numbers represent the distribution of that energy and describe order, and order is a function of perception and understanding. Order has scope and hierarchical dependence, and each scope has its own laws and natural measure. Chaos is the baseline state of existence, and the order that arises does so to more efficiently return to a state of chaos. David Bohm's implicate/explicate theory sheds light on the relationship between the appearance, or "relativity" of order and chaos.*

Keywords: *energy, numbers, randomness, existence, Universe*



This image was taken from the lecture "The Limits of our Knowledge" by Gresham Professor of Astronomy, Joseph Silk, a leading expert on the early Universe and one of the world's most sought-after science communicators.
Image copyright Abrams and Primack, Inc.

Everything that exists must follow the laws of existence, for the penalty of not following those laws is non-existence. This is why we call it the *Laws of Physics* and not the *Highly Recommended Suggestions of Physics*. These laws of physics can change between one state or scope of matter and another, so before we look at some of the laws, let's look at the scopes that these laws must function within and some of the concepts we use to understand them.

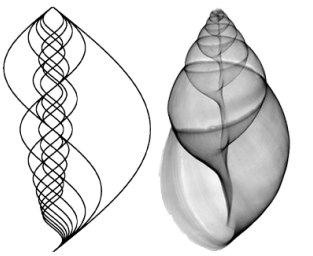
The Definition of Numbers

Numbers is the language of these laws, so let's start there. One way to think about numbers, in general, is to imagine *value* as a conceptual form of energy, and a particular value, like 1 or 2, is an instance of that concept. This should not be too difficult

as this is pretty much a description that even Platonists (*"numbers are non-physical, non-sensible things that exist in an objective realm beyond time and space"*) and Nominalists (*"numbers don't exist outside of abstract man-made concepts"*) would agree on. This is not a new idea, although it's an idea that comes more from psychology and philosophy than mathematics[22]. As concepts are energetic, they follow the laws of energy and have stable and unstable patterns. The concept of *numbers* is one such stable pattern that emerged from the stable patterns in nature we can observe and includes a number of sub-concepts, such as *real*, *rational*, *whole*, *natural*, *irrational*, and more, each with their own set of laws and definitions. From the tholonic perspective, it does not matter if the Platonist's or Nominalist's theories are correct; all that matters is that the concept of *number* exists and that these concepts represent instances of energy, because everything that exists, from things to ideas, are instances of energy.

We start with 0, *nothingness*, which, as explained earlier, also creates the concept of *somethingness*. We can represent all instances of *somethingness* with the non-numerical symbol of ∞ or *unity* of the system that contains all somethingness as 1. This *unity* can be the *unity* of a bag filled with 12 oranges or the *unity* of the Universe. This is the first polarity, 0 and 1, *nothingness* and *unity of all somethingness*.

Energy always moves in one direction, the path of least resistance, the most efficient path, resulting in a more balanced state. 0 and 1 represent the most imbalanced state that can exist. How will this become more balanced? The next numerical concept after 1 is 2, because with the values [0,1] we can create the values [0,1,2] with the the 3 combinations of 0+0, 1+0, and 1+1. But how does 2 create a more balanced state between 0 and 1?


Harmonic Series of wavelengths

Seashell (Bullina Virgo)

The only way 2 can balance the energy between 0 and 1 would be if 2 represented half of the value of 1, or 1÷2, or $\frac{1}{2}$. Of course, there is still an opportunity to create more balance with the next value that can be created with the 9 combinations of [0,1,2] that creates 5 unique values of [0,1,2,3,4]. Of this new set, the smallest possible value greater than the last value of 2 must be used, according to the laws of energy, and that value is 3. Now we have $\frac{1}{2}$ and $\frac{1}{3}$. Again, with [0,1,2,3] we have 16 combinations that creates 7 unique values of [0,1,2,3,4,5,6] of which the smallest new value is 4, giving us $\frac{1}{4}$. This goes on forever, and what we end up with is a series of values called the *harmonic series*, $0, 1, \frac{1}{2}\frac{1}{3}\frac{1}{4}\frac{1}{5}\frac{1}{6}\frac{1}{7}\frac{1}{8}\ldots$ (right image, left side).

The harmonic series is a fundamental pattern in nature and of music. No doubt, this is the idea behind the Pythagorean concept that "Physical matter is music solidified", or the Sanskrit *Nada Brahma*, "Existence is sound" (literally "god sound"), or the legends of Native Americans, Judeo-Christians, Hindu cosmology, Egyptian, Aboriginals, Mayans, Norse, and many other cultures that have a story of sound shattering the void of nothingness. Imagine the progression of numbers as the harmonic series $\frac{1}{1}\frac{1}{2}\frac{1}{3}\frac{1}{4}$, rather than the typical progression of 1,2,3,4, (or what could also accurately be written as $\frac{1}{1}\frac{2}{1}\frac{3}{1}\frac{4}{1}$), is consistent with concepts of how energy is distributed and

conserved and shows numbers as an *internal expansion* of energy that begins with the initial all-encompassing concept *unity*. In our numbers-as-energy thought experiment, the number 1 represents the largest value and contains *within* it all numbers. If there is a finite amount of energy in the Universe, then the entirety of that energy can be represented as 1 quantity, or 1 unit, of energy. This would then imply that it is the *division* of that 1 unit of energy that accounts for creation. That division, or at least one fundamental pattern of that division, will be the natural harmonic patterns of energy as shown in the harmonic series, the music of the Universe, literally and figuratively. We find the harmonic series of $\frac{1}{1} \rightarrow \frac{1}{\infty}$ in the energy patterns of nature and the Universe because numbers *do* represent energy.

Key 10: Numbers represent energy and the number sequence represents the balancing of energy and the creation of all things.

We don't count in fractions, we count in whole numbers, but the difference between whole numbers and fractions is how we compare *unity* with the *parts of unity*; $\frac{whole}{part}$ vs. $\frac{part}{whole}$. If we want to know how much of the *whole* does a *part* account for, then we divide the *whole* by the *part*, but if we want to know much of the *part* does the *whole* account for, then we divide the *part* by the *whole*. As we humans, and all things, are *parts* of the *whole* of the Universe, we can only consider the *parts*, as we have no concept of *the* whole other than it is a *whole*, a *unity*, 1 *existence*, that all things have in common, so $\frac{2}{1}\frac{3}{1}\frac{4}{1}$ becomes 2,3,4.

Key 11: From a Universal perspective, numbers only get smaller. From an individual perspective, numbers only get larger.

The Definition of Order

Order refers to the arrangement of things. Those things can be objects, patterns, sequences, ideas, methods, or anything that can be defined. We typically think of *order* as some type of structured, organized pattern, but these are types of *order* of which there are many, such as random, chaotic, linear, to name just a few. If we consider chaos to be a spectrum from 0 to ∞, then we can also consider *order* to be the inverse spectrum of ∞ to 0. This would be similar to how we measure light or heat. We don't measure the cold by how much cold there is but by how much heat there is because cold and dark represents a lack of energy, and we can only measure the absence of something by how much of that something exists. If something has no energy, it simply does not exist. No energy is total nothingness. It is the same for order, but where energy exists as different types, such as light and heat, order exists as different types, such as random or linear. The lack of order is not *nothingness*, as there is still energy, but it is chaos. In this way, chaos/order is an instance of the archetype of nothingness/somethingness. The comparison of energy to order is not just metaphorical, as *order* requires energy, or more accurately, energy produces *order*.

Does that mean everything has *order*? To some degree, yes, because for something to have 0 *order*, it would also have to have 0 energy, and if there was 0 energy, it would not exist. We that says then that anything that exists, exists somewhere on the spectrum of *chaos/order*. The challenge is determining the type and degree of *chaos/order*, and towards that end, we have discovered and invented many types of chaos and order, with many more to come.

Key 12: Everything that exists has energy, therefore, has some type of order.

Key 13: Order is a measure of energy.

We use the term "order" quite liberally, even to describe things that have no apparent or even provable order, such as in "chaotic order" or "random order". If everything has *order*, then the word becomes meaningless. Traditionally, "order" refers to a discernible pattern, while the more post-modern view of "order" refers to "the way things are", synonymous with "arrangement", ordered or not.

So what do we really mean when we say something is *ordered*? The tholonic view of *order*, in practical terms, refers to how predictable something is, and this predictability is the result of our level of understanding of that thing. This makes *order* more of a perception than a description. Guppies[23], honeybees[24], hyenas[25], dogs[26], and numerous other animals have some abilities to recognize *order*. A 10-month-old baby can recognize *order* among 3 items, and a crow's ability to recognize the *order* of process is equal to that of a 7-year-old human, but none of them could solve a Rubik's Cube because their understanding of *order* is limited. *Order*, then, is also a measure of understanding.

Key 14: Order is a measure of understanding and exists to the degree that it is perceivable, definable, and predictable.

Chaos precedes order, just as our *lack* of perception and understanding precedes our perception and understanding. This would be pretty difficult to argue with, which is why we can say:

Key 15: Chaos precedes order.

This is not to say that chaos and order are only defined by the limits of our perception, but that our definitions of them are. Nor is this a claim that there is no such thing as chaos, only order yet to be perceived, but we do claim that, as chaos precedes order, it is chaos that is the baseline of reality and creation as it is the most energy-efficient, most sustainable state, and that order must be one state or condition of chaos as order is less sustainable than chaos. Order is, with respect to chaos, a temporary state.

What does "sustainable" mean?

Before we go on, let's agree on what *sustainable* even means, as that concept will come up a lot. Unfortunately, there are many different definitions for the word, especially with the growth of ecological awareness, which has come to dominate the term. Intuitively, the meaning of *sustainability* seems clear and obvious, but what does that mean technically? The simplest definition that applies to all contexts is "the state of some thing or some process that coheres, disintegrates, or is destructive to its environment or context". This clearly applies to environmental concerns, but how does it apply to things like atoms, planets, and concepts? On a purely material level, sustainability deepens on the fields of force that attract and repel. Things, from atoms to planets, are held together by these internal force fields as long as the force of these fields are stronger than any external force fields from their environment.

Key 16: Sustainability is the result of a balance between internal and external fields of force.

When we are talking about systems within systems, which is how our reality is put together, we are also talking about the chaos and order within each of these systems. Every *system* has a *scope*, which can be its limits, range, reach, field, horizon, capacity, structure, or other terms used to indicate where that system begins and ends in various contexts. The scope of a container is in what is can contain, how much it can contain, how long it can contain it, and so on. The scope of water is anywhere there is water in any of its forms. The scope of the Sun is wherever the energy of the Sun reaches, how long it will last, etc. For the record, in the world of quantum physics, everything that we can know about a system is described by its wave function. This is called the *wave-function postulate*, and the wave-function (symbolized as *psi*, ψ) of any system has limits, and those limits define the scope of a system.

The scope of a system is also defined by the order of a system, or rather, by where that order breaks down within the system. Newton's laws of Motion work fine until things get too big, small, hot, cold, or fast, at which point those laws begin to falter because the order of reality begins to change in those zones that lay at the outskirts of the order of reality we exist in.

For example, imagine you are 1 mile tall. You can see perfectly ordered patches and circles of corn crops. As you shrunk, that order would be less and less visible, but you would begin to see the order of rows of corn stalks. As you continue to shrink, you would lose sight of the corn crops, but begin to see the order of the plant, then the cells, then the molecules, then the atom, then the quarks, then the preons, then … nothing, I suppose, as preons are the 0-dimensional conceptual points that create quarks. The same applies to what you would see if you grew larger and larger, passing through the solar system, the galaxy, the multiverse, and finally… ?

Another example might be how we destroy the order of a tree to create the order of lumber. All that was the part of the order of the tree comes to an end, and the order that is created by the lumber, such as a chair, comes into being. These are 2 scopes of order that do not overlap, but they are both children of an order that remains in both tree and lumber, such as the structure of wood (cellulose, hemicelluloses, and lignin). This tells us that the order of lumber and trees are subsets of, or dependent upon, or within, the structure of wood. When that wood is burnt, its order and the order

of anything that is within its order, such as a desk or tree, disappears via pyrolysis, or thermal degradation, and the hydrocarbons are broken down to carbon dioxide, water vapor and carbon (ash), each of which abiding by the order within the scope it now exists.

You can easily imagine the never ending series of *chaos* ⟶ *order* ⟶ *chaos* ⟶ *order* ⟶ *chaos* ⟶ *order* &hellip…

For this reason we also claim:

> **Key 16:** Order precedes chaos.

True random events may be the exception, as a truly random event doesn't follow any rule, pattern, or reason. By this definition, it's likely that nothing in nature is truly random, but it's probably safe to say that there are *apparent* random events that *do* follow currently unknown rules, patterns, and reason. This makes it impossible to prove anything is random, and that's even if we ignore Gödel's *incompleteness theorem* which proves that it is impossible to prove any absolute truth, only truths based on unprovable assumptions. For this reason, we'll be avoiding the concept of randomness for the most part in this book, but we can say that:

> **Key 17:** Randomness can create chaos, but chaos cannot create randomness.

The Scope of Order

Some laws are *universal*, and some are *local*. However, what we are calling *universal* may well be *local*, but in a much larger context that we cannot see beyond.

An example of a *local* law might be the *Standard Model* of particle physics that describes the relationship between 3 of the 4 fundamental forces and the elementary particles that make up the matter in our universe. This is a set of laws and constants that apply to particle physics. You don't see this model replicated in larger systems because the model only makes sense when dealing with the reality of sub-atomic particles. Likewise, Oort constants only apply to the rotational properties of the Milky Way.

Science calls the scope of our everyday Newtonian reality *Macrorealism*[27] or *Local Realism*, and the subatomic scope is called *Quantum Mechanics*. Understanding how different laws operate in different scopes is an area of intense research and has led to such landmark experiments like:

- **Bell's inequalities**: The math that enables the distinction between two different views of reality, typically the relativistic view vs. the quantum view.

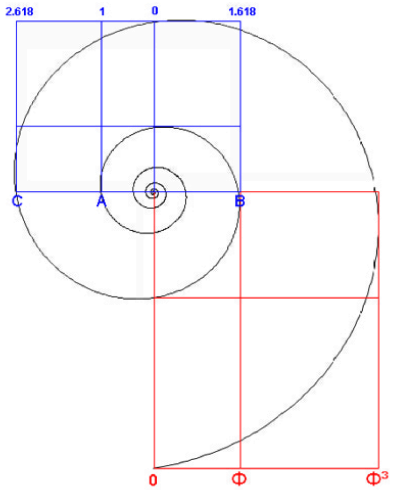
- **Einstein-Podolsky-Rosen paradox**: The speculation that every particle in the Universe knows the state of every other particle in the Universe at all times and that no two particles in the Universe have the same state.

- **Leggett-Garg inequality**: The claim that in the quantum world something can be in two states at the same time, which is impossible for the macroscopic world.

… to name a few.

Key 18: Local laws and constants are valid only within the context of their scope.

An example of universal laws or patterns that span many scopes might be the Fibonacci sequence (0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377…) and its constant ratio of Phi (φ), also called the *Golden Ratio* (1:1.618). This number is the ratio that not only pops up in galaxies and sea shells but, according to some evolutionary and chemical scientists [28], is the ratio that keeps all of existence in order and is the shape of space-time itself.

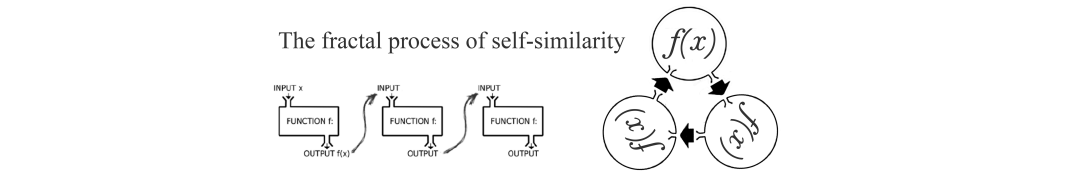


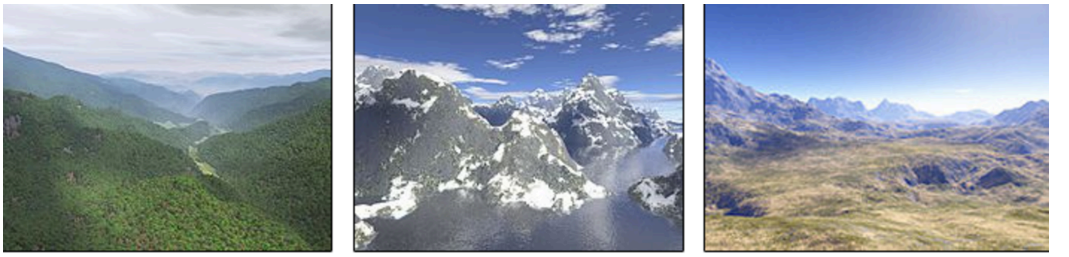
Another universal law might be simple fractal math formulas that have a form like $f(x)= x^2-1$, which can be found across all forms of existence [29], suggesting that self-similarity is a universal property. *Power laws* explain how a relative change in one measurement can result in a proportional relative change in another (e.g., logarithmic or exponential), and we see these across all levels of existence.

An example of *proportional relative change* can be demonstrated with a line, which we'll call L, that is 1 inch long. Doubling its length gives us a line that is 2 inches long, or $L \times 2$, or $L \times 2^1$ When the line defines a square, doubling its length create an area that is $L \times 4$, or $L \times 2^2$. In a cube, the volume becomes L × 8, or $L \times 2^3$. If the line defined something that was 4-dimensional, like a hyper-cube, then the "volume"

of that hyper-cube would be $L \times 16$, or $L \times 2^4$. So, by doubling the defining element of a line, we see exponential growth in the size of whatever the line is describing. This is "how a relative change in one measurement can result in a proportional relative change in another measurement".

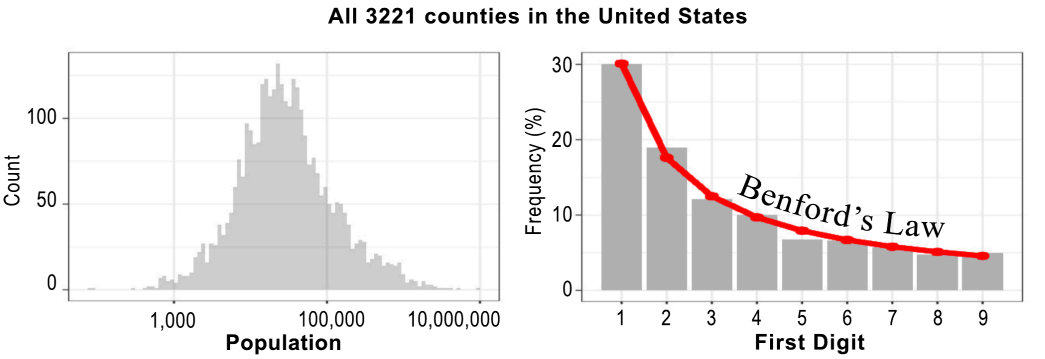
These universal laws can be found in astronomy, physics, biology, meteorology, cosmology, mathematics, economics, and many other areas, including society, wealth and work distribution, competition, media exposure, and much more.





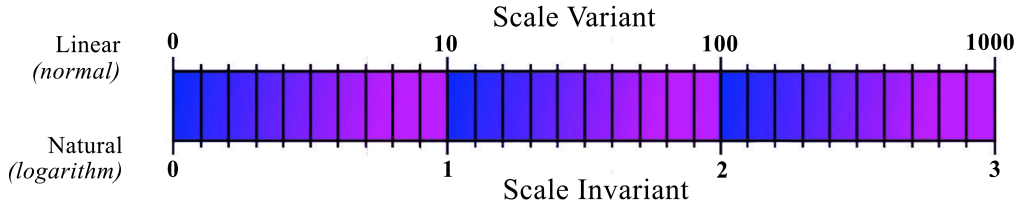
Natural landscapes that were generated by self-similar fractal algorithms

Another universal law might be Benford's law, which is the pattern that describes the chances of what will be the first digit of a number that naturally appears, such as lengths of rivers, populations, and numbers printed on the first page of a newspaper. This might sound odd, as simple logic would suggest that the chances of, say, the number 1 being the first digit in a series of numbers would be 1 in 9, but that is not the case. About 150 years ago, it was discovered that the number 1 is the first digit 30% of the time, while the number 9 is only about 5%! In the two images below, we can see this law in action when we plot the populations of every county in the U.S. and then count the first digit of each of those populations.



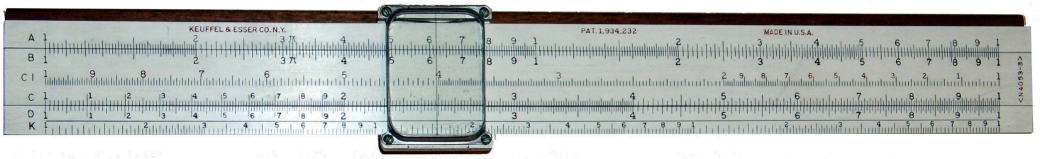
This is because, while we may count in a linear fashion, 1,2,3,4,... etc., nature distributes itself in a logarithmic fashion. For example, let's say we have 3 naturally occurring scales; 0 to 10, 10 to 100, and 100 to 1000. With each new scale, we simply add a 0. There are 10 numbers in the 1st scale, 90 in the 2nd scale, and 900 in the 3rd scale,

but as far as nature is concerned, each scale has an infinite number of divisions, so they are effectively the same from nature's perspective. This is how we discovered (or why we invented) logarithms; to replicate the *natural* way numbers work (and why we call it *natural logarithms*). The image below shows these 2 scales.



Logarithms allow us to multiply simply by adding. For example, the log of 10 = 1, and the log of 100 = 2, so instead of multiplying 10×100 to get 1000, we can just add 1+2. This gives us 3, and because we are using the normal base 10 system, we convert these log values back to normal values with 10^3, which is 1000.

Once upon a time, before the invention of digital calculators, and after its invention in 1859 by a French artillery officer, every engineer had a *slide rule*, which allowed them to do this multiplication-by-adding (and more) simply by sliding some rulers back and forth.



How does this apply to 30% of all our numbers beginning with a 1? Because the occurrence of any number as the 1st digit is the log of the next number minus the log of the number. So, the chances that the value of 1 will be the first value in a random list of numbers is *log(2)-log(1)=0.30*, or 30%/ For the value of 9, the chances are *log(10)-log(9)=0.045*, or 4.5%.

The point here is not to get into the math but to show that nature's concept of scale, or scope, is *invariant*, meaning nature treats all the scopes or scales the same, so we would expect to find laws in one scale equally applied to all scales.

Appearance of Order

A good visual example of how these laws (in this case, oscillation and entropy, which is discussed at length in the next chapter) affect our perception and understanding of chaos and order is in the distribution of the energy that fills every corner of the Universe. This is known as *cosmic microwave background radiation* (CMBR). The left image (of the right chart) shows the CMBR

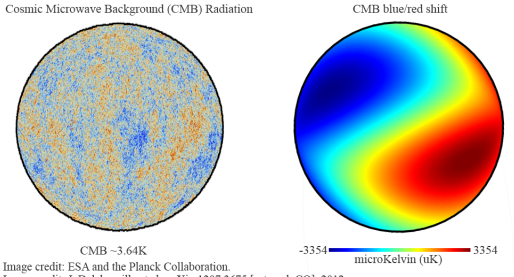


Image credit: ESA and the Planck Collaboration.
Image credit: J. Delabrouille et al., arXiv:1207.3675 [astro-ph.CO], 2012.

filling the known Universe with ~2.64 K of heat (-269.51 C°, about 4° C above absolute 0). The energy is widely dispersed, has no pattern, and is a perfect example of chaos. It may actually be perfect chaos, which is why some scientists are proposing to use CMBR as a natural source of random numbers[30] (as true random numbers are extremely difficult to generate). But, to see this natural chaos, a major correction had to be applied to adjust for *red-shifted* and *blue-shifted* effects due to our galaxy hurling through the Universe at about 1,497,600 miles per hour which make anything we are heading toward look *blue-er*, and everything we are heading away from look *red-er* (due to the compression and expansion of the wavelengths of light). The way we *actually* see this omnipresent chaos is shown in the right image. The only factor that accounts for the difference between the appearance of chaos and order is the movement of our galaxy. It is through this movement that chaos *appears* as order.

Can we say that if something *appears* to have order then it *has* order? In this case, the chaos remains chaos, and the apparent order is the result of the laws of interaction of energy. We can say that about anything, as where there is no movement, there is no energy, and where there is no energy, there is the *chaos of nothingness*.

Key 19: Movement creates order.

The CMBR is considered the smoking-gun evidence of the Big Bang[31], which is the scientific explanation of when the *chaos of somethingness* met the *chaos of nothingness*.

Key 20: Movement creates chaos.

Order of laws

Even though there are many, many classes of laws, for this writing, we are only going to use these two general scopes of laws, the *local* and the *universal*, because no matter what laws may exist, they will fall into one of these two scopes (or children of these scopes).

Local laws may be local, but they can affect everything that is built upon them. Everything is made of atoms, and atoms are the size they are because of *Planck's constant*, which is the relationship between the mass and the frequency of the particles that make up an atom. If that constant were to change, the entire Universe would be radically different, if it even existed at all. If Planck's constant was to increase by only 2.5%, the size of Earth, its spin, gravity, and the density of the atmosphere would all increase. If it was 2.5% less, Earth would shrink by 20%, its rotation would increase, gravity would lessen, and much of the atmosphere would disappear. If Planck's constant changed from 6.2618×10^{-34} to 6.2618×10^{-20}, the radius of an atom would go from being microscopically small to being 100 times the distance to the nearest star!

On a more realistic level, consider a bridge made of bricks. If the laws that bind molecules together change such that they have a lesser negative charge, then the bridge would melt on a warm day. The (relatively) *universal* Newtonian laws did not change; only the *local* laws changed on the particle level.

It's logical that the laws of particle physics affect everything that exists because everything is made of particles, but that does not make the laws of particle physics *universal* in scope, rather, that which is made of particles is *dependent* on the laws that operate in the *local* particle scope, thereby making the effects of local laws farther reaching than their domain.

Key 21: Local laws can alter everything that descends from or depends on them.

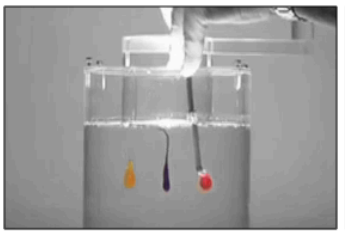
The State of Order

It is these laws that create order out of chaos and chaos out of order. That order exists between the two states of zero-energy chaos and total-energy chaos, but even within the chaos, we can find clues of order as neither a *zero* or *total* state of chaos is possible in the material domain, just *closest-to-zero* and *closest-to-total* states.

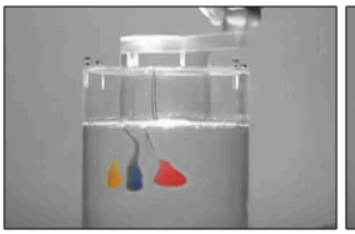
One theory that sheds light on new thinking about chaos and order is David Bohm's *Implicate Explicate theory*. In short, Bohm describes this theory by stating:

> *In the enfolded (or implicate) order, space and time are no longer the dominant factors determining the relationships of dependence or independence of different elements. Rather, an entirely different sort of basic connection of elements is possible, from which our ordinary notions of space and time, along with those of separately existent material particles, are abstracted as forms derived from the deeper order. These ordinary notions, in fact, appear in what is called the "explicate" or "unfolded" order, which is a special and distinguished form contained within the general totality of all the implicate orders.* ***~Bohm, "Wholeness and the Implicate Order"***

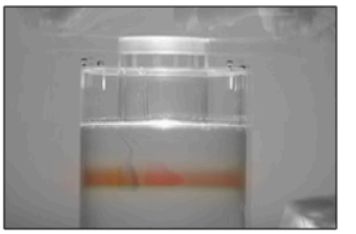
To demonstrate this concept, we can use an ink droplet analogy. In this demonstration, we place three drops of ink into a cylinder of glycerin. The cylinders are then turned, which mixes the ink droplets together. Reversing the spin of the cylinders then reconstructs the ink drops. When the ink droplets are in their original form, at the beginning and the end of the spinning, they are *explicitly* ink droplets and have the *order* of ink drops. When they are mixed up together, they are *implicitly* ink droplets only, and their order would be considered more *chaotic*. The order of the ink drops has been destroyed, but the information of that order exists as a *virtual* ink-drop, an archetype only, within the chaos of their mixed state.[32]



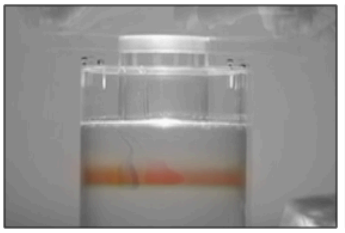
Ink droplets are added to a glycerine filled cylinder. They're ***explicit*** droplets because we can identify them as droplets.



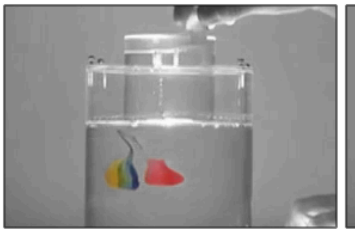
The cylinder is spun clockwise to mix the droplets together.



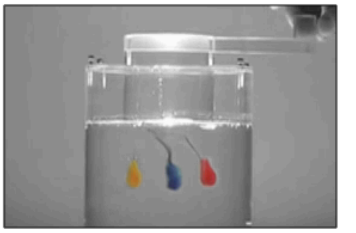
The droplets are all mixed together in a blur. They are now ***implicit*** droplets, as they no longer exist as droplets.



The cylinder is then spun in the counter-clockwise direction.



Eventualy the ***implicit*** droplets begin to retake their original form.

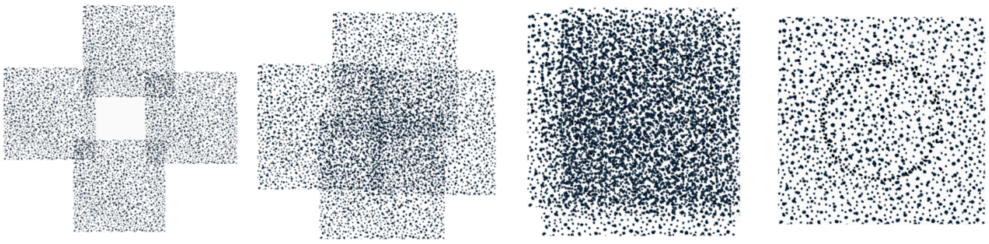


The original form is returned to the ***explicit*** state of droplets.

In practical terms, this theory says that when something exists in the physical world, it is in an *explicit*, or *unfolded* state. To exist in this state, it must conform to a set of rules that define the archetype(s) of the form it will take. When it does not conform to these rules, it still exists, but only in an *implicit* or *enfolded* state, a state we cannot see or interact with (under normal circumstances). This sounds similar to the "sea" of potential or unmanifest wave functions that collapse into form. This state has its own rules as well but they are a super-set of the *explicit* rules, making a *thing*, or physical reality as we know it, just one sub-state of a *thing*, or reality, it can be in.

It is these local and universal laws that cause form to *unfold,* to *explicate* itself, self-organize, form patterns and move in accordance with these laws. By the same token, these laws will also *enfold* or *implicate* these forms, causing them to return to an unrecognizable state, but even in that unrecognizable state, they are contributing to or affecting other yet-to-coalesce implicate patterns. Depending on the form and the medium, and under certain conditions, one can imagine how the past (that which is enfolding) and the future (that which is unfolding) can affect each other and in both directions.

Here is another example that perhaps better displays the idea. Below are four pages that started out as identical. To each page were added some random dots, but *within* a narrow region of a circular line; however, none of those dots stood out from the page's original random dots and were in no way identifiable as *special* dots. As we merge the pages, the randomness gets denser and denser until all 4 pages are perfectly aligned, and those extra random dots can easily be seen as a circular line.



The circle is *implicit* in the random dots of each separate page and *explicit* when the pages line up together in the proper manner. In this example, the *local* pattern would be the random pattern on each page, which represents the scope, and the *universal* pattern would be the parts of the circle as it exists on every page.

All of this addresses the relationship between instantiation and context, in that how something comes into existence and how it is expressed is dependent on the context and scope of where it is being expressed. This concept is not only a technical or scientific one but also a philosophical one that we can see in Buddhism as the principle of *Pratītyasamutpāda*, which means *dependent arising*, and which states that all phenomena (*dharma*) arise in dependence upon other phenomena (*dharmas*). More than that, it also implies that the significance of something is defined by its environment. An obvious example of this is how the same wooden ball falls in the air, is motionless on the ground, and rises in the water.

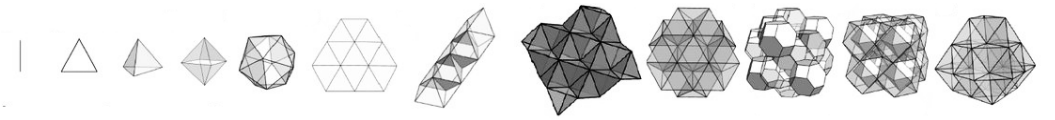
Now we can continue on the subject of energy.

4: THE LAWS

Energy creates movement, movement follows laws, laws create order, and order directs energy.

Synopsis: *Each level of existence expresses the Universal laws according to the context and local laws it exists within. If awareness is an expression of energy, then we should expect to see these laws in action, but in a different context. Entropy is as much a philosophical concept as it is a physics concept as it is the law of balance. We look at entropy from various perspectives and in relation to chaos, the 2nd law of Thermodynamics, inertia, pattern, and oscillation. These are tied together in Newton's 2nd law of motion which is deconstructed to a simple pattern, expanded upon, and re-applied to various contexts such as alchemy, electricity, and relativity.*

Keywords: *energy, entropy, microstates, patterns, systems, Newton, balance*



Entropy

There are many laws that describe how energy works. From the 3rd century B.C., starting with the *Archimedes Principle* to the present laws of quantum mechanics, researchers have been compiling and updating a long list of laws.

One of these universal laws is *energy will always follow the path of least resistance.* This is called *entropy* and explains why water runs downhill to form rivers, why electricity works, why high pressure seeks low pressure, and why stuff breaks.

In short, entropy measures the amount of energy *not* available for work. Yes, it sounds (and is) confusing. It's like a cashier saying, "Here's your not 70¢ change" as she hands you 30¢ from the $1 you gave her for a 70¢ chicklet. There is no such *thing* as entropy, as it measures the lack of something. The entropy of something is like using someone's age as a measure of how much life they have left; more equals less. Why can't we just measure how much energy something has rather than what it doesn't have? For the same reason, we can't start counting down from 82 years to 0 as a measure of how much life someone has left. We don't know what the final age of anyone will be, nor do we know what the final energy state of something will be. So, instead of handing the cashier $1, you just say, "charge it". She has no idea what your credit balance is, so instead of giving you change she just adds the 70¢ to your growing credit card debt.

A quick review of entropy…

Classical entropy is a thermodynamic concept based on the observations of how heat, or energy, moves. At its core, it is a measure of how many different ways something can occur, so there is no such *thing* as entropy. It is a statistical concept only, but it is still real. You don't have -$10, but you do have a debt of $10. Entropy is to energy what financial debt is to net cash balance (but can also apply to other concepts of "debt" and "value"). Using the credit card metaphor, imagine how many ways you can spend money in the Dubai Mall, the largest mall in the world (1,124,000 m^2, or 157 football fields!). Now imagine how many ways you can spend money in Mexican Hat, Utah.

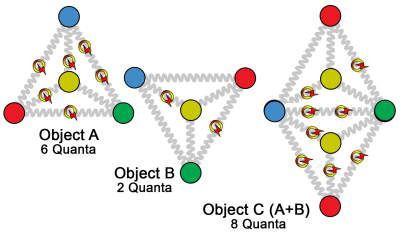
Your credit card has extremely low entropy in Mexican Hat and extremely high entropy in the Dubai mall. In this metaphor, entropy's "how many ways something can occur" equates to how many ways you can increase your credit card debt until you are flat broke (high debt, high entropy). Taking the metaphor further, how much "work" can your $300 limit credit card do in Dubai? Not much, as you can maybe get a decent sandwich or a couple pairs of socks. How much "work" can this same card do at the "last chance" gas station/convenience store for miles and miles in any direction? Quite a bit more if we define "work" as "obtaining the resources needed to get home". On the other hand, let's say your card had a $1,000,000 limit, and "work" is defined as "obtaining the resources to live luxuriously". Your card can do a lot of "work" in Dubai but would be useless in Mexican Hat. OK, we have taken some liberties in this metaphor, but the point is clear. The ability to do "work" depends on the scope of the "work" and the context of where it is applied. The local entropy of your card is high in Dubai and low in Mexican Hat when "work" means one thing and the opposite when "work" means something else. However, the *universal* entropy of your card remains the same, very high, as $300 of potential debt doesn't do much "work" relative to the 226 trillion in debt floating around in the Universe of money. As black holes account for most of the total entropy in the Universe, you can think of the banks and governments that control and own most of this debt as financial black holes.

In a very non-metaphorical example, imagine two simple chemical elements named A and B, each made of 4 particles with 6 bonds that hold them together. In chemistry, energy is stored in the bonds. This energy is measured in units called *quanta*. In A there are 6 quanta, and in B there are 2 quanta, so A is a little hotter than B. These quanta can move around and be in any arrangement in each object, but the energy will stay the same because there will always be 6 quanta in A and 2 quanta in B. The various configurations that these quanta can have are called *microstates*.

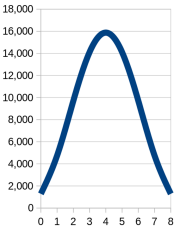
A microstate represents one possible arrangement. For example, how many microstates exist when tossing 2 pennies? There are 4: HH, TH, HT, TT, which means each microstate has a 25% chance. If the experiment required 10 tosses, then the experiment has 10 *macrostates*, with each macrostate having 4 microstates. Another

example of microstates is a poker hand. In a deck of 52 cards, there are 8.06×10^{67} possible microstates for the deck and 2.6 million possible hands of 5 cards, which is 2.6 million microstates. Of those, only 40 of these microstates are part of the *macrostate* of *straight*-flush, while over 1 million are part of the macrostate called *junk* (official poker term for polite society). Any one of the 2.6 million possible microstates is equally likely, but one macrostate has 40 microstates, and one has 1,000,000 microstates, so there's a 25000:1 chance you'll get dealt a junk hand, thanks to entropy.

Returning to our example, a new object, C, is created by putting A and B together. Now, C has 8 quanta and 12 bonds, so there are many more potential microstates. But which microstates are the most likely to occur? The microstates that create the most balanced state of energy are the most likely to occur, just like when you untie a balloon, the high-pressure air inside the balloon is more likely to exit the balloon than outside air entering the balloon.



Mstates per element		Total Microstates	Probability
A	B		
0	8	1,287	2%
1	7	4,752	6%
2	6	9,702	13%
3	5	14,112	19%
4	**4**	**15,876**	**21%**
5	3	14,112	19%
6	2	9,702	13%
7	1	4,752	6%
8	0	1,287	3%



Energy will naturally balance itself out simply because there are more microstates available when the quanta are evenly distributed. This is like saying a head/tail pair is more likely to occur because there are twice as many head/tail microstates because both coins have a head and a tail, or, if you have 10 red buckets and 1 green bucket outside when it rains, there will be more total water in the red buckets than the green.

This example uses the energy in chemical bonds, but energy can be distributed in other ways, such as the radiation emitted by the Universe and which we can see in the *cosmic background radiation*. Where does this energy go? Nowhere. It just gets recycled because there is nothing to share the energy with outside of this universe.

The formula for entropy looks astonishingly simple, but like that other simple-looking formula, $E=mc^2$, it can get insanely complex. The change in entropy (ΔS) is the change in heat (Q) divided by temperature (T), so $\Delta S=\Delta Q/T$. The *state* of entropy (S) is simply the natural log (ln) of the number of microstates (Ω), so $S=ln(\Omega)$. In the coin toss example, there are 4 microstates, so $ln(4)=1.386$, or in the case of our elements, we'd use the maximum number of possible microstates per configuration, so $ln(15876)=9.672$.

However, these numbers are useless until we relate them to something real. In thermodynamics, this number would be multiplied by the *Boltzmann Constant*, k, or k_B, which is the ratio of kinetic energy to temperature as measured in joules. That value would be different in other areas, like economics or information theory. In the conceptual, philosophical, metaphysical, or thought experiment realms, there is no "real" value to apply, but this has more to do with the way we understand what is

“real” because the conceptual, philosophical, metaphysical, and thought experiment realms all use energy in various forms, but not all of those forms are known to us, and measuring them can be difficult, impossible, or meaningless.

So, what system has the least microstates? A system with the least energy, like something at absolute 0 temperature, which is impossible. The best we can do is get really, really close (the record so far is 0.0001 Kelvin). On the other end, what system has the most microstates? The only system that can have all possible microstates in it… the Universe, which appears to have a finite amount of energy in it.

To sum up, entropy measures the degree to which the energy of a system is balanced. More entropy means more dispersion of energy, more balancing of differences, low pressure. Less entropy means less dispersion, more imbalance, more difference, high pressure, which are expressed differently in various contexts, environments, and conditions.

Continuing…

OK, that was the thermodynamic explanation of entropy, and the one most people learn about, but here we will use the word more broadly to reflect a more general concept, which is the ratio *distribution of resources* over *availability of resources*, or $\frac{resource-distribution}{resources-available}$. So, an abundance of resources with nowhere to go would be a very **low entropy** of $\frac{1}{1000000}$ vs. few resources that are distributed via many channels, which has a very **high entropy** of $\frac{1000000}{1}$. In our broader context of the concept of entropy, this is similar to saying $\frac{kinetic-energy}{potential-energy}$, which would be saying that a large river with only 1 possible path, such as the *Grand Canyon*, would be a **low entropy** system, while a trickling stream that empties into a swamp is a **high-entropy** system.

We all know what “work” means when we say, “That was a lot of work”, but if someone asked us, “How many joules did you expend?”, not knowing the answer doesn’t mean you don’t understand the concept of “work”, and even if you did know the answer, that would have no bearing on the difficulty of that “work”. Listening to your brother-in-law’s bad poetry reading that you were forced to sit through could be a lot more “work” than building that stone wall around your garden if you have limited “resources” for listening to bad poetry, but many “resources” for building your stone wall even though it requires 770% more joules/hr.

When we speak of *systems*, we are referring to any process that has identifiable boundaries. In thermodynamics, a system is simply any matter around which a boundary can be drawn, so a rock is a system, and so is a planet or a galaxy. Poker is a system because it has conceptual boundaries, such as the rules of the game and the cards used to play. Cars, living organisms, and computers are systems made up of smaller systems that include things like transmissions, organs, and hard-drives. Even a drawing on a piece of paper can be a system as it has boundaries, and inside those boundaries is something that can be described in terms of energy.

The amount of entropy a system has is relative to that system, which we'll call *local entropy*. As every system exists withing a larger system, the larger system's *local entropy* acts like *universal entropy* to the embedded system.

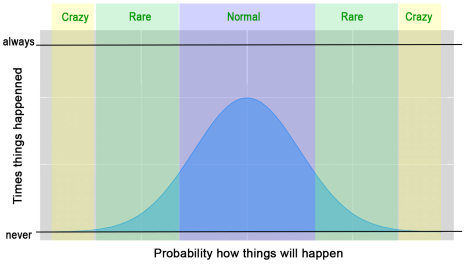
This is also why the common argument that evolution breaks the 2nd law of thermodynamics is short-sighted. The argument is that if entropy always leads to disorder, then how can life continually evolve into more ordered forms if entropy is always increasing? Either the theory of evolution is wrong, or the 2nd law of thermodynamics is wrong. The confusion comes from the fact that the 2nd law only applies to isolated systems, or *local entropy*, because, obviously, if a system gets energy pumped into it, the entropy will be lowered. If the poker deck is fattened by 6 additional J♥ cards at every shuffle, then, yeah, the 2nd law no longer applies to the close system of poker. We can easily test this with a simple capacitor that, when external energy is applied to it, collects positive ions on one side and negative ions on the other… a virtual impossibility in an isolated system where the 2nd law applies. Likewise, the Earth is *not* an isolated system as it receives 5×10^{23} HP of energy ever second, which is 3.72×10^{26} joules (or watts) per second. That's a lot of horses galloping to earth from outer space every second, bringing 500,000 times more energy than is consumed by humans.

So, we can say that the 2nd law applies to the *local entropy* of the *closed* system of the entire Universe, as that is the ultimate *universal entropy*, but the Earth can't be a *closed* system given that it is *open* to the Sun (and the rest of the Universe if you accept the somewhat dubious but interesting Electric Universe paradigm).

An analogy we'll often use as a common example of entropy is that of a battery. A charged battery has low entropy (high usable energy), and a dead battery has high entropy (no usable energy). A dead battery still has all the energy it had before. Still, it is no longer usable because the energy, in the form of electrons, has moved from the negative side of the battery to the positive side until it achieved balance, and there are no more electrons left on the negative side of the battery that were compelled by the laws of balance (entropy) to move&hellip. However, they are still in the battery and acting like electrons, but they are "useless" (from a battery's work perspective).

Let's return to the poker hand example. A junk hand, like 7♥ 2♣ A♦ J♥ 6♣, has high entropy because the cards are disordered, or the order is chaotic. On the other hand, 7♥ 8♥ 9♥ 10♥ J♥ has low entropy as there is order in both suit and value, and there is imbalance as all the cards are close in suit and value, which is very rare. It's not a coincidence that the higher value of a poker hand, the lower the entropy of that hand.

The 2nd law of Thermodynamics states "*In an isolated system, entropy never decreases*". This is another way to say that all systems tend to move towards their most stable or low energy states because entropy, or the *inability* to do work, will always increase. And why won't it decrease? Because left alone, energy, *on average*, will never imbalance itself. The "on average" part is important because, if we wanted to get nit-picky about it, there is an extremely small chance, like 1 in 10^{24} that this law can be broken (see generic probability chart - right), but, technically speaking, you could drop an ice cube in hot water and there is an insanely small chance the ice will get colder and the hot water will get hotter, and it may be the first and last time that will ever happen in existence. The 2nd law is not actually a *law*, but a statistical observation, i.e., there is nothing that says that entropy could not be reversed other than the unlikely probability that it can be reversed. Even so, there can be a spontaneous decrease of entropy[33], not to mention the hypothetical and highly speculative case put forth that the 2nd law exists in reverse somewhere in the Universe[34], thereby keeping the entropy level of the Universe at 0. It may be easy to simply toss this idea aside until you consider it was written by the man who is considered the smartest human to have ever lived (that we know about. See *Appendix K, "William James Sedis"*).



We can apply the concept of entropy to any 2 things that are different and interact with each other. For example, have you ever wondered why one drop of black paint in a can of white paint makes a big difference, but one drop of white paint in a can of black paint makes little difference? We can say that white paint has high entropy and black paint has low entropy if we defined the concept of "work" not as kinetic energy but as how much light was reflected or absorbed by a color. We could measure how much "work" each color performs. If white paint has an entropy of 1 (absorbs least) and black paint an entropy of 10 (absorbs most), we would discover that if we mix 1 part to 10 of each, than the white color changes by 10%, but the black color changes by only 1%. This application of entropy may work, but it is also confusing because now we are using the same terms and concepts that equates the color black with dispersion, disorder, balanced energy and the color white with pressure, pattern, order, and imbalance. This is a good example as to the importance of context. Entropy can be measured as energy radiation in one context but energy absorption in another.

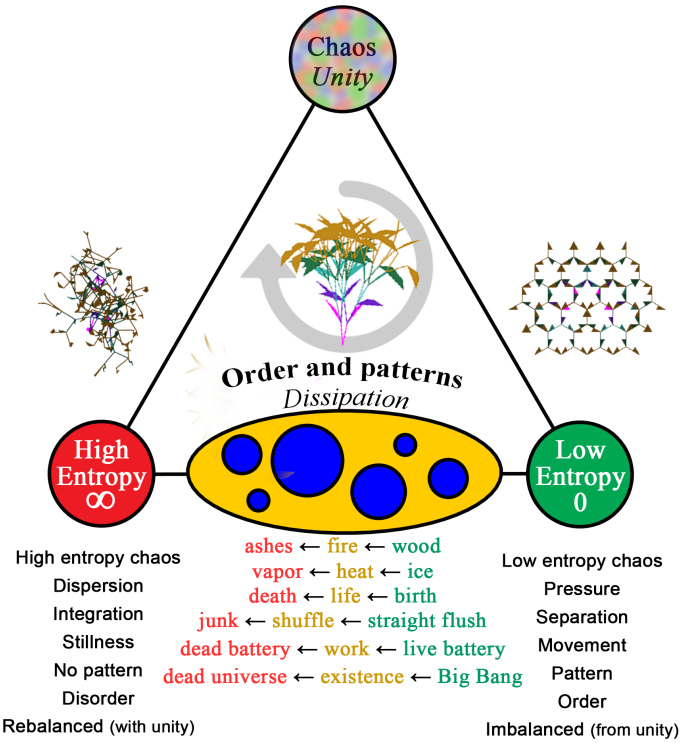
The universality of the concept of entropy is why it appears in everything from thermodynamics to culture to economics, and anything else that can have microstates, be they chemical, electrical, physical, spiritual, emotional, conceptual, etc.. For example:

- **In probability theory**, the entropy of a random variable is the measure of uncertainty.
- **In information theory**, the *compression entropy* of a compressed file, like a zipped file or a JPEG image, measures the amount of information loss.
- **In sociology**, entropy is the natural decay of a society's structure (such as law, organization, convention, ethics, etc.). This also applies to cultures. Think of the Green Berets of the U.S. Army Special Forces as having low entropy (high ability to work), and a 1967 free-love hippie commune in Haight-

Ashbury as high entropy (low ability to work). *Note: I have nothing against free-love hippie communes. I have lived on a few and even resided in Haight-Ashbury back in the day.*

We may be taking liberties with the concept of entropy, but even in the science world, the definitions of entropy are so diverse and specific that even scientists get confused:

> *"As a consequence of this diversity of uses and concepts [of entropy], we may ask whether the use of the term entropy has any meaning. Is there really something linking this diversity, or is the use of the same term with so many meanings just misleading?"* 35. ***~Annick Lesne, author and researcher at the Institut des Hautes Etudes Scientifiques***



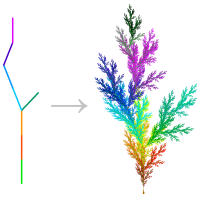
For our purposes, we can accept that entropy is not so much a measure of chaos but a *dimension of chaos*, where *chaos*, in general, is defined as the *"lack of order in form or movement of energy due to the dispersion and balancing of energy"*.

For this reason, we defined 2 types of chaos; *high-entropy chaos* and *low-entropy chaos*. This is the same concept as the *chaos of 0* and the *chaos of* ∞ as mentioned in the first chapter, but here the context is the material reality, not mathematics.

Key 22: Just as there is the *chaos of 0* and the *chaos of* ∞, there is *low-entropy chaos* and *high-entropy chaos*.

The image above is a general diagram of this concept. The 3 patterns in the center show examples of low-entropy (right), high-entropy (left), and a balance of low and high entropy (center). It's not a coincidence that the center image looks a bit like a plant, as we show later that reality, and living things especially, are a mixture of order and chaos, high and low entropy combined. This may be due to the fact that the evolution of complex systems actually decreases entropy while the process of growth itself increases entropy, making life a constant negotiation between these 2 opposite forces.

In summary: - Everything moves from low to high entropy as a result of some sort of dynamic process that dissipates energy, such as heat in the case of thermodynamics. - Everything exists on the spectrum of low→high entropy - The effect is a result of the cause, which becomes a new cause for a new effect. This is like the cause/effect chain of microstates within microstates.



Microstates within microstates within microstates… this is equivalent to the previous self-similar fractal pattern of the rainbow bush, but unlike our rainbow bush, the entropic systems branching off one another are chaotic, dynamic systems, so not simply chaos, but an endless chain of chaotic systems within chaotic systems. But is every system with microstates chaotic? To some degree, yes, but where the predictability is near 100%, it doesn't *appear* chaotic. Perhaps we can say it's only a "little bit" chaotic. But even the most predictable event only exists at the end of a long chain of chaotic, (previously) unpredictable events. Consider all the things that had to take place from the first cause to make a predictable coin-toss possible… planets had to be formed, life had to evolve, consciousness and meta-consciousness had to evolve and be "discovered", etc. The coin-toss may not be very chaotic, but countless events leading up to it certainly were, which is why everything is part of and built upon the chaotic system that is this reality.

If everything is chaotic, where is the order? Ironically, order is a subset of chaos, and everything *is* unpredictable to some degree, and that "degree" is measured in *probabilities*.[36] We live our lives as if the Sun rising tomorrow is 100% guaranteed, but it isn't. Sure, there may be only a 1 in 10^{-99} chance it won't rise, but it's still a probabilistic value. And the reason this probability is so high is because the solar system has reached a state of equilibrium, a state of high entropy. Not its highest state of entropy, for when that happens, everything is reduced to cosmic dust and/or black holes, but enough equilibrium to make it sustainable… for now. There simply aren't any more microstates that are more likely than the one we currently live in. Suppose this equilibrium is disturbed by a huge foreign object passing through our space or a change in the temperature of the Sun, or some other change large enough to create more microstates than currently exist. In that case, the chaos of low-entropy/high-energy will ensue and rearrange everything. Order emerges when some degree of equilibrium of the parent system is reached. As the parent system slowly increases its entropy and loses energy, the more energetic, more chaotic, low-entropy child system becomes more stable until it also reaches equilibrium as it loses energy. Life on earth could not begin until the chaos of Earth's early days settled down; Earth could not

form until the Sun was finished forming in the center of a nebula that was formed by gravity's effect on dust and gas, etc., etc., all the way back to the Big Bang. No single thing, system, or order exists that is not dependent on the equilibrium of the system it is built upon.

Does this mean that one day the probability of getting heads in a coin flip will not be 50%? In one sense, yes, because when all matter and energy is equally dispersed, there won't be any coins, humans, or planets, so while the archetype of that system might exist, the reality of it will not. It must be stated that this is according to the traditional *Heat Death* theory of how the Universe ends. There are other theories, but in any case, the stable systems will destabilize, and no one will exist to toss coins that don't exist. The coin-toss and the coin-tossers both exist because the system of our current reality, the state of reality at this moment in the life-cycle of the Universe, allows for them to exist. Imagine tossing a coin during the Big Bang or inside a black hole. It's a silly idea because all the laws that allow for tossing and tossers, while they still exist, are uninstantiated and exist only as archetypes.

In our current system, a coin toss is not a random event but one of deterministic chaos. The reason it is unpredictable is because there are too many micro variables in a toss that effect the outcome; muscle movement, atmosphere, relative starting position, spin axis, initial velocity, imperfections in the coin, whether it's to be caught or allowed to bounce around when it lands, etc. A common coin flip, where the coin is not allowed to bounce around when it lands, is a 12-dimensional system in that it requires 12 dimensions to define, just like 3 dimensions are required to describe a cube or 4 dimensions to describe a cube in time. The archetype, however, is only 1-dimensional but with 2 possible states, given that the result needs only 1 of 2 values to perfectly describe it. This means that while there are only 2 possible outcomes of heads or tails, with 12 dimensions, there are 479,001,600 ways to get there. If we could flip a perfectly vertically balanced coin (because a horizontal coin has a 51% chance of landing in the same orientation as it started because there will always be 1 more even number of flips) in a vacuum with precise pressure on a precise location, and do it identically each time, the result could easily be predicted by Newton's law of motion and angular momentum, at least in theory. The possibility of creating such a system is (probably) physically impossible, thanks to chaos. Because the system of a coin toss is a subsystem of countless parent subsystems, not only those of time and space, but those of the tosser, the environment, the coin, etc., all of which are descendants from the initial chaos of creation, any change to any of those parent systems will change the coin toss system.

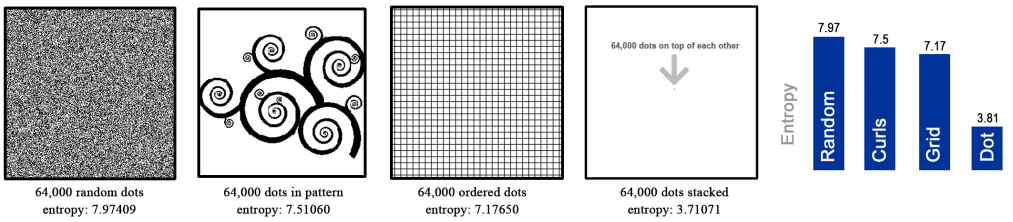
Of course, in the quantum world, the coin flip is like a Schrödinger's Cat scenario, but instead of the cat being in an *eigen state* of dead *and* alive, the unobserved coin is in an eigen state of heads *and* tails, and it is only the observation of the coin that determines which state will collapse into reality. In this world view, everything that is probabilistic (which is everything that happens), is undetermined until we observe it. However, as the results of such quantum events results in the same outcomes as the old fashion probabilities and classical physics, we'll stick to that. [37]

The laws we live in are stable enough for now, but they may be changing as you read this. We know, at least according to our current understanding, that even the most fundamental laws, like Newton's laws of Motion, will completely break down as the Universe approaches *statistical equilibrium*, which means there is an equal

probability that energy will move in any direction in a reality where all matter, which has decomposed into atomic dust, just wiggles around like 10^{86} lost atomic-sized bugs in space as they slowly wait to get sucked into a black hole. The speed of light, Planck's Constant, and every other constant, may be changing due to the expansion of the Universe, quantum changes, increasing dark-matter, and who knows how many other things we haven't even discovered yet. Many scientists have not only theorized this but there is some evidence to support this idea. The problem is, on a cosmic time scale (using the new theory that the Universe will come to an end in a mere 4 billion years[38]), if the Universe lasted 100 years, we humans have only been measuring things for the equivalent of 43 millionths of a second (5,000 years), so we can only speculate about the other 99.9999995% of existence.

Key 23: Order is high-entropy chaos that exists within high-entropy chaos.

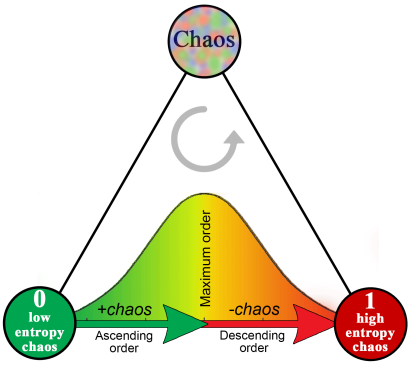
Entropy tells us how close a system is to equilibrium, where perfect equilibrium equals perfect disorder (because all the parts are spread out equally). Random dots on a page is perfect equilibrium and, therefore high-entropy. If those dots create any sort of pattern, then this is not an equal distribution of dots and therefore has lower entropy, which means there must be more energy available for "work". Exactly what "work" means with regard to information we won't get into here, but as proof of this, below are the results of the entropy analysis[39] of 4 images, each with 64,000 black dots on a white background. You can easily see that more order equals less entropy.



64,000 random dots entropy: 7.97409 | 64,000 dots in pattern entropy: 7.51060 | 64,000 ordered dots entropy: 7.17650 | 64,000 dots stacked entropy: 3.71071

So, where does chaos fit into this?

Earlier, we defined 2 kinds of chaos; *high-entropy chaos* and *low-entry chaos*. We also posited that the most efficient and stable expressions of energy will exist in the middle of these poles. This naturally divides the spectrum into 2 parts; *ascending order* and *descending order*. This is shown in the image on the right using our previous model (and flipping the X-axis to match the traditional left → right x-axis format). As this is a spectrum of chaos, the *ascending side* that shows a positive growth of order will be called *positive chaos*, and the descending side, which shows negative growth of order, is called *negative chaos*.

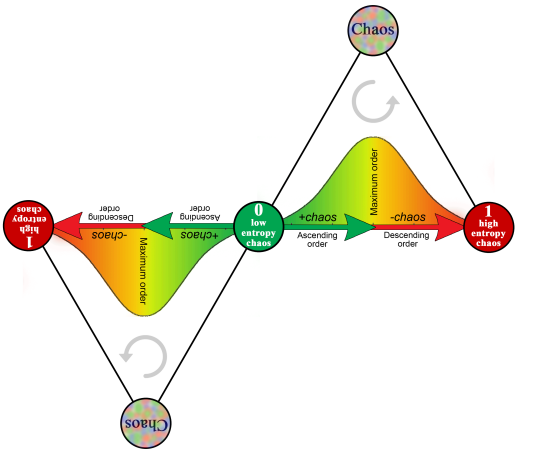


- **Positive Chaos** (+chaos, low-entropy chaos): The chaos begins with the single point representing the totality of somethingness and expands from there. On a universal scale, this would include the moment of the Big Bang to

the moment of maximum order. On the scale of life, this would represent the time from a germinated seed to a flower. This describes the *implicate →explicate* stage of creation.

- **Negative Chaos** (-chaos, high-entropy chaos): The chaos that begins when the maximum expression of order begins to decline and continues until all order has been disintegrated. Universally, this equates to a dead system, no pattern, no movement of energy, no order of time… just a bunch of dead matter, totally diffused, perfectly balanced, doing nothing. On a scale of life, it is the journey from flower to compost. This describes the *explicate →implicate* stage of creation.

It would seem more symmetrical and intuitive if the +*chaos* and -*chaos* moved in opposite directions, but that would mean that the -*chaos* would be going backward in time, which is impossible as that would completely break the 2nd law of Thermodynamics… right? Not according to the man who has been called "The most intelligent man to ever walk the Earth". That might be a bit hyperbolic and certainly impossible to prove as IQ tests, as we know them today, did not exist in his time, but William James Sidis, who spoke 8 languages, wrote 4 academic books by age 8 and was reading the *New York Times* at 18 months, is alleged to have had an estimated IQ of 250-300, which is ironic as he considered any sort of intelligence testing as "silly, pedantic, and grossly misleading". Still, to put this in perspective, in the entire world today, there is a statistical chance that 1 person on the planet has an IQ of 192. An IQ of 200 is a 1:76,000,000,000 rarity, so with an IQ of 250+, statistically speaking, he may well have been the smartest human to ever exist (See *Appendix K, "William James Sidis"*, for more)

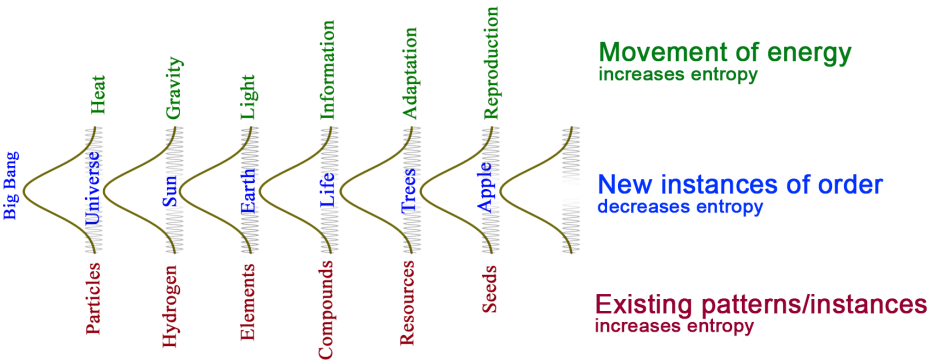


According to Sidis' highly speculative hypothesis, "*The Animate and the Inanimate*" [40], published in 1920 when he was 20 years old, entropy could, in theory at least, be reversed, or rather, there exist parts of the Universe that run opposite to ours, like a mirror image of this reality. These "parts" are interspersed with the "parts" that run "forward", similar to a checkerboard, but we will never be able to see them or travel to them because they exist is a different space-time. This sounds like a very early concept of the modern "many worlds" hypothesis of quantum mechanics and shares many of the same concepts of the modern idea that before the Big Bang, the Universe was a reflection of what it is today [41]. In this reversed Universe, time does not run backward in the way you might think because its *anti-time* or *negative-time* properties exist in a Universe of *anti-matter*, so everything appears the same to those living in *anti-world* as long as all matter, energy, and time were equally inverted. This is called the *charge, parity, and time (CPT) reversal symmetry* and is well understood as *The C.P.T. Theorem*. If we woke up tomorrow morning in the *anti-world* version of our current reality we live in now, we would not notice anything different, as long as the CPT was inverted. Applying Sidis' ideas to our model might look something like

the right image, which represents just 2 “squares” on the checkerboard of reversing realities, but this image would also apply to the modern CPT ideas, but where the 0 low-entropy (green) dot would represent the Big Bang.

Being of moderate IQ and abilities, I can’t say anything as to the validity or insanity of Sidis’ ideas, but given that Sedis predicted black holes, the expanding Universe, and the Big Bang using only the 2nd law of Thermodynamics, and years before the discovery of the expanding Universe and the Big Bang, his ideas are worth consideration. Regardless, it is not the validity of this idea that is important here, it is the patterns that this idea implies, which is a pattern fundamental to all of existence, from ancient oracles to electricity to DNA, as we’ll see.

As this process of emergence and decay of order applies to any system, then it also applies to not just the life of the Universe, but the life of all the systems created in the Universe, and the systems that those systems create, etc., etc., making reality a dynamic fractal of countless embedded systems of *low entropy chaos → order→ high entropy chaos*.



In this manner, the emergence of an apple follows the same rules as the emergence of the Universe, as does the tree, weather, planet, solar system, etc., that made the existence of that apple possible. The energy and the archetypes of these rules instantiate within the context and scope of each creation which we recognize as the laws of creation for each context and scope. The example (above image) is a very simple model, but that does not distract from its validity.

> *“Only simple qualitative arguments can reveal the fundamental [laws].”* ***~Philippe Nozières, award-winning quantum physicist***
>
> *“Truth is recognized as such by its simplicity and harmony”.* ***~Isaac Newton***

Because this energy dispersion is the result of energy always seeking balance, we say that entropy is a measure of the state of balance, as higher entropy equals more balance or equilibrium of energy.

Key 24: Entropy is a measure of balance.

If this is true, then it is also true that:

Key 25: "Work" is the act of balancing energy and is a result of the imbalance of energy.

"Entropy" is a noun as it only describes a system's state. What is the verb for the actions that led to that state? If entropy is a measure of balance and work is the act of balancing, then "work" is the verb form of entropy. More work = more balance = more entropy.

Because we will be talking about balance throughout this book, let's clarify what we mean when we use the word. "Entropy" and "work" are different words to describe different yet interdependent concepts, but the single word "balance" is synonymous with both concepts because the word "balance" can be a verb *and* a noun:

- **Balance:** (verb) The application of force required to achieve a stable state of being; Work.
- **Balance:** (noun) The achieved stable state of being; Entropy.

The word itself comes from the Latin *bi+lanx*, meaning "two sauce pans", as in the classic hanging scales. The scales show when something is *balanced* (noun) after the two sides were *balanced* (verb). It will be up to the reader to determine which definition is more contextually appropriate.

Before we leave the subject of entropy, there is another concept to keep in mind that will come up again later:

Information is entropic. This concept was demonstrated in a thought experiment of James Maxwell in 1867 that threatened to break the 2nd law of Thermodynamics. The gist of this hypothetical was if a magical being of some sort that generated no heat or friction was able to calculate the trajectories of every atom in two chambers, one filled with hot gas and one filled with cold gas, he would be able to selectively allow certain atoms to pass through a door that he could open or close that would make the hot side hotter and the cold side colder. This was a massive violation of the 2nd law, and the inability of anyone to figure out the solution was why Lord Kelvin dubbed this imaginary being *Maxwell's Demon*. 100 years later, the solution was found[42]: the energy needed for this demon to collect and store all the information on all the atoms would generate enough entropy to compensate for the seemingly impossible result. Hence, information has entropy, or more correctly, information that is stored. That storage could be a hard drive, scribbled notes, the brain, or whatever matter the information is stored in/on. It was also shown that erasing that information raised the entropy even more (in case you were thinking of tricking entropy by only storing a minimum amount of new data and constantly erasing the old data).

Three Spectrums of Energy

Here is a good place to introduce a concept useful in understanding the tholonic model. It's more of a hypothesis, really, and is similar to Sidis' idea that there is a part of reality where entropy might move in reverse. The tholonic model agrees with this idea, but it is the "where" in reality that is in question.

We understand electromagnetic energy as the spectrum of non-material energy expressed in waves, frequencies, photons, etc. On the material scale, the energy spectrum is expressed via matter, that is, electrons, protons, and neutrons, which create atoms. This material spectrum is understood as the periodic table of elements. It is a much shorter spectrum and a much "slower" or denser spectrum. We say this because matter is energy divided by the speed of light squared ($m=E/c^2$). c^2 is a very, very large value as it is the fastest speed possible in the material world multiplied by itself (i.e., 8,987,551,790,000,000).

Thermodynamic entropy is a material phenomenon as it only exists where matter exists. It is also generally stated that no entropy is produced during the emitting of radiation; hence, there is no entropy in the electromagnetic. So, the physical world, which is the densest form of energy, increases in entropy, and the world of light, which is the purest form of energy (that science knows of), has no entropy. Is there yet another form of energy even purer than light in a world where entropy decreases? The tholonic model claims there is and refers to it as *tholonic energy*, which is far broader than the electromagnetic spectrum and can be understood as *coherent thought*. This energy does exist in another "part" of the Universe, but on another level of reality, not a location. This is the world that Plato referred to in his *Theory of Ideas*, where ideas have a life of their own, even if they do not have any instance in the material world. In this world, ideas are objective realities, not subjective, and in the world of thoughts, concepts, and archetypes, entropy decreases. In other words, ideas, if they are sustainable and survive, naturally evolve and grow. Coherent thought, or the ability to form ideas, is an instance of this energy as expressed through the context of consciousness, making consciousness one source of energy. While this energy is above and beyond our classical understanding of energy, it is just as integrated into our reality as heat and electricity, and reality itself is just as dependent on it to exist.

Key 26: Order and pattern requires energy.

The inter-connectivity of things, whether directly or via radiations such as heat and light, allows for the movement of energy, and this movement creates order. Therefore, the idea that everything is connected is not simply an abstract philosophical concept but a necessity for order and therefore, life.

Key 27: Everything is in a state of seeking and/or maintaining balance.

At first, the idea that perfect balance results in perfect chaos seems contradictory, or at least counter-intuitive, probably because in our life, and reality in general, (near) perfect balance only exists in small systems, and only temporarily, and under very

controlled conditions. When it does exist, we tend to ignore it because perfect balance doesn't *do* anything, as there is no movement, no energy. Outside of a laboratory, something that is perfectly balanced is more likely to be tossed in the garbage. However, if we can extend the idea of balance beyond the classical ideas of movement, we can understand this concept better.

We know that all of existence is a combination of *systems* within *systems*, from the system of galaxies to the systems of plants and pebbles. This applies to other contexts as well, such as economics. When we pay $3 for a pound of carrots, we have balanced the difference between a particular instance of supply (of that bag of carrots) and demand (for Bob's carrot soup). Once that transaction is complete, there is perfect balance in the very small *system* of that transaction. That particular instance, being perfectly balanced, no longer has any energy moving through it. It is a dead system and is relegated back to the chaos from which is came. That instance was but one of many in the larger systems that had to exist for it to even instantiate in the first place; markets, sales, distribution, supply chains, farming, etc., etc., and all the systems they depend on as well to exist.

We know that, ultimately, these systems exist for a single purpose: balancing energy. We also know that the more microstates there are, the more opportunity there exists for more energy to balance quicker. This means that the ultimate goal of energy, which is balance, can be enhanced, optimized, or made more efficient if there are more microstates, and because it is more efficient, the movement of energy will naturally find a way to create more microstates. And how will energy create conditions where more microstates will naturally emerge? Through order! Consider the tremendous amount of order on countless levels that must be maintained for you to buy a $3 bag of carrots from a farm 3000 miles away.

Key 28: The purpose of order is to facilitate chaos.

Economics, and anything else that we create, conceptually or physically, is as natural a form of evolution as lifeless bio-goo evolving into life, and for the exact same reason.

In the old days, 3.8 billion years ago, when there were plenty of blobs of carbon-based bio-goo, but before life existed, the bio-goo blobs were getting a lot of this free-energy from the Sun and the Earth's molten core via hydro-thermal vents, for example. According to the laws of energy, these blobs needed to expend the same amount of energy they took in, but carbon-based blobs have no special energy-dissipation abilities, at least not as blobs. Energy moving through the blobs, or anything for that matter, will consequently cause changes that allow for more efficient movement of energy. Over time, the blobs self-organized to allow better dissipation of excess energy. Patterns of energy began to form in these blobs, and these patterns became what we have come to know as life. This is (perhaps) why the earliest forms of life are believed to be 4+ billion-year-old microorganisms that formed on the hydro-thermal vents on the ocean floor that spew out boiling hot water up to 500°C (930°F). That heat was their source of energy, and it delivered significantly more energy than the Sun (and continues to be a significant contributor to ocean warming and of methane gas). The earliest direct evidence of life are the 3.5 billion-year-old microfossils found on the hot water vents in the Pilbara region of Western Australia.

According to Jeremy England, a 31-year-old assistant professor at the Massachusetts Institute of Technology who derived a mathematical formula[43] that explains how the movement of energy can convert a carbon-based blob into a life form:

> *You start with a random clump of atoms, and if you shine light on it for long enough, it should not be so surprising that you get a plant.*

But it's not just for plants, as we see this also in non-carbon blobs, for example, self-assembling crystals and quasi-crystals.

Key 29: Life is a self-organizing consequence of the movement of energy for the purpose of moving energy.

In that first moment the Universe came into being, there was the total energy of the Universe in the space of a soccer ball (or 0-dimensional point of singularity, depending on what theory you subscribe to) that was released into a void of nothingness. It was this maximum state of imbalance that began the balancing act of reality. At the end of the Universe, there is no longer any need for energy to balance itself because everything has become balanced. The Universe started with a verb, and ends with a noun. Wherever there is energy, there is some level of balance, and we say that things are "balanced" when the net energy difference between any two states is 0. Prior to that difference being 0, there is *balancing*, the movement of energy, and this movement creates order.

Key 30: Chaos is a state of order, order is a state of chaos.

Inertia

Another law to look at is Newton's 1st law of motion, the law of inertia, which states *an object will remain at rest or move at a constant speed in a straight line unless it is acted upon by an unbalanced force*. This is why things don't fly around randomly on their own for no reason. This is mentioned here because it is important to remember that no thing moves unless energy is applied as force. Inertia is to movement what gravity is to things. Gravity and inertia are interrelated forces that effect matter, as you can calculate the gravitational field of something by how much energy is needed to move it.

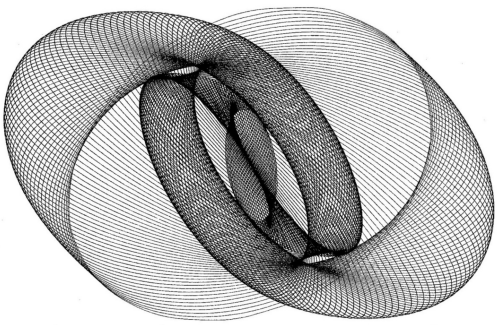
These are just two of the many laws that determine how our reality works, at least within the scope of the reality we tend to deal with. On the quantum and galactic levels, or super high or low energy states, things may operate a bit differently.

Inertia and entropy always ensure that everything will operate at its most efficient level. What does "operate" mean in this context? It means the optimal movement of energy. And what does "optimal" mean? It means the most efficient way to balance energy. As energy only moves when there is a difference between two states, the

movement of energy is meant to do only one thing, and that is to minimize that difference by creating a balance between two conditions that are not the same, whether it's the conditions of *somethingness* and *nothingness* or just a few degrees of temperature. Once balance is achieved, the movement stops. A balanced battery is a battery at peace with itself&hellip, and it is also a dead battery.

The optimum condition for the movement of energy between two states is one where both states have maximum expression within the limitations and abilities of both of those states.

A beautiful example of entropy and inertia that works today as much as it did thousands of years ago can be easily demonstrated with something called the *harmonograph*. This is a fascinating and entertaining device that creates an oscillation from an initial push (low entropy, high imbalance) and then draws a trace of its path as that initial energy slowly diminishes (inertia, balancing), until it stops (high entropy, balanced). [44]



Pattern

We recognize that patterns exist in nature, life, physics, math, etc., and it can be useful to think of patterns like rivers that have been etched into the terrain of reality from the first moments of creation and represent a path of least resistance for the movement of energy, be it electrical, physical, conceptual, emotional or otherwise. Reality, no matter the scope or how one perceives it, is built upon layers and layers of patterns that sit on top of the chaos from which they emerged. A recurring theme in this book is about recognizing patterns that repeat in various themes, contexts, and scopes. Some of these meta-patterns are clear, such as the Fibonacci sequence and exponential curves, while others are more hidden and even challenge our ideas of what defines a pattern. An excellent book on this subject is "*Patterns in Nature: Why the natural world looks the way it does*" [45].

The position put forth here is that any two phenomena that share the same pattern are, at least, 2 instances of 1 pattern. This differs from the scientific view that the pattern is a result of the cause, and while this makes sense from a bottom-up perspective, from a top-down perspective, it also makes sense that it is the archetype of a pattern that is the cause of the instance (form). Perhaps this is a matter of perspective, or perhaps it is the natural order of creations that the archetypes, ideas, or awareness of something must exist before it can be instantiated.

Patterns can be qualitative as well as quantitative. Take the example of a Ford Fairlane in Chicago and a Ford Fairlane in Argentina. These two instances represent the quantitative patterns of the concept of "Ford Fairlane". They have no direct connection to one another, but some of what is learned about one will apply to the other. Each of

these instances has a cultural pattern as well. The Ford Fairlane was a “muscle car” and a source of pride among its fans in the U.S., but in Argentina, the Ford Fairlane was used by the secret police of the Dictatorship during the “Dirty War” and was a source of fear and intimidation. Here are 2 instances of the same quantitative pattern that have 2 very different qualitative patterns.

Just about everything we see or even know has some sort of subjective, cultural, idealized, or assumed quality imposed onto it, and it is difficult, if not impossible, to isolate objective patterns from subjective patterns. Yes, I know this sounds a lot like pointless “navel gazing”, but it’s a real question in the quantum mechanical “many worlds” model where subjective observations determine which of the many possible realities the observers will find themselves. Even more confounding, tests[46] of the famous *Wigner’s Friend Paradox*[47] suggest that objective facts don’t even exist, as different individual observers, all observing to same objective reality, can obverse different objective facts! If this is the case, even science itself is not able to separate objective patterns from subjective patterns. We think of superstition, ritual, beliefs, and the dogma that often accompanies them as having their roots in mixing the subjective with the objective, but it may turn out that this is the case for all of existence as well.

If subjective/qualitative and objective/quantitative patterns are not independent of each other, does this mean science is superstitious and dogmatic? Yes, to the degree that human consciousness, which will never ultimately be free of assumptions, axioms, and beliefs, plays a role in the “objective facts” we observe.

We have seen in in the sciences historically. Modern math was stifled for about a thousand years thanks to the Greek’s superstitious ideas about, and prohibition of, irrational numbers, which were forbidden to be written. When one of Pythagoras’ students, Hippasus, discovered irrational numbers, he was (depending on your source of history) drowned by the gods for such heresy or murdered because he revealed how to construct a dodecahedron inside a sphere. In either case, irrationality and superstition prevailed, even in the world of math. It wasn’t until the early 9th century A.D., thanks to Caliph Al-Ma’mun of the Abbasid Caliphate and his *House of Wisdom* in Baghdad (which the Mongols destroyed in the 13th century) that mathematics was liberated from its irrational fear of irrational numbers. We also saw earlier that the same was true for the number 0, which was banned in Florence in 1299. Later in this book, you will see modern examples of similar thinking in the sciences.

Oscillation

A law or pattern that can be seen in every part of the Universe is that everything oscillates in some manner. There can be chaotic movement of energy, but oscillation allows for a more sustainable movement of energy. Why? Because “*sustainability is the result of a balance between internal and external fields of force*” and energy *must* move and will always seek stability and balance. Oscillation is more balanced and stable than chaos simply due to the *conservation of angular momentum*, which we all know form bicycles and gyroscopes.

But… before we move on

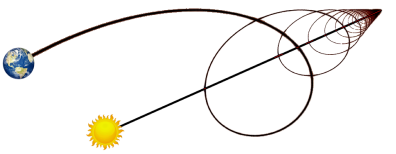
- The reality is we have no idea how energy travels between its source and destination because we can't see it or measure it as it is traveling (but the secret is revealed in a few chapters!). We can only see it when it interacts with something, like a detector. Once detected, we can know the amplitude, frequency, and wavelength of the energy, but that is only telling us its properties when it interacts with the detector. So, we say, "if energy leaves as X frequency and arrives as X frequency, it must be traveling at X frequency". This makes sense and even works as a model, but that doesn't mean that is what is *actually* happening. This might sound like a fringe idea, but no less fringe than the idea that energy can act like a wave until it is observed, at which point it acts like a particle. The reason the wave model works is not because that it what is *actually* happening in reality but because it can *predict* what is happening. The wave model is just that, a model. The reality is that energy must move, and the wave model is currently the best way to understand and describe that movement. In the future, there may be a radically different model that uses 12-dimensions to describe energy in a universe where everything happened at once in 17-dimensions, or some other unimaginable scenario. That future may not be too far off because the AI singularity, which is when AI is capable of exponentially rebuilding itself, is predicted to happen in 2045, and it's a pretty safe bet that a self-learning, self-assembling intelligence with virtually unlimited resources and abilities will come up with a model of everything that is radically different (and a model that only AI can comprehend) from ours.

Nikola Tesla said:

> *"All things have a frequency and a vibration."*

The tholonic view is: because everything has energy, everything oscillates in *some fashion* and has *some kind* of frequency pattern. We say it this way to include chaos as well as order.

Key 31: Everything exists in a state of duality.



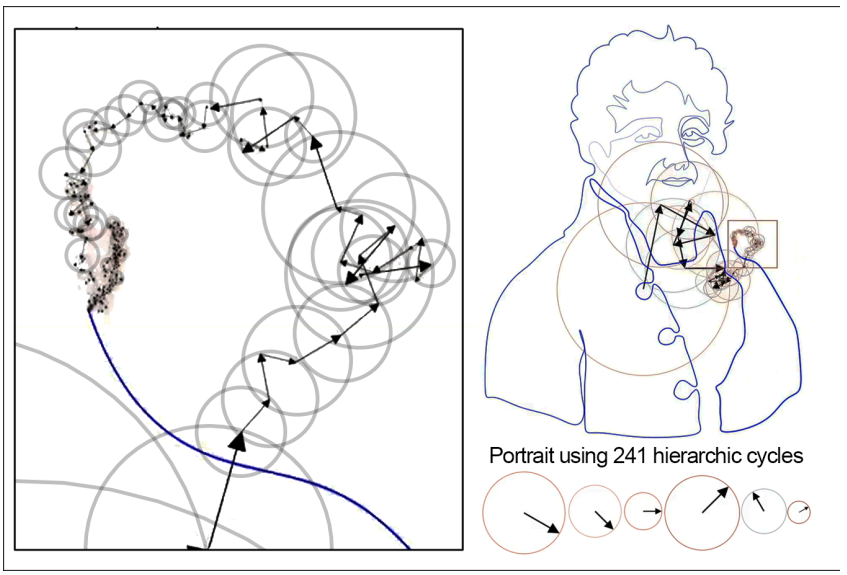
We typically think of light waves and sound waves as the classic example of oscillations, but the heavenly bodies are also oscillating particles on a cosmic scale. If we look at the orbits of planets, stars, and galaxies, they are not simply spinning around in a rather 2D plane of orbits but spinning around while moving in a direction.

People have been fascinated with this obvious commonality across all of creation for some time. Kepler himself was quite interested in the relationship between planetary frequencies and musical frequencies, but the study of planetary and musical relationships goes back to at least the 9th century with Eriugena, an Irish monk, theologian, and Neoplatonist philosopher most famous for his work "The Division of Nature",

which claims that nature's first primary division was the division between that which **is** (*being* or *somethingness*) and that which is **not** (*nonbeing* or *nothingness*). His work was condemned as "*swarming with worms of heretical perversity*". The 9th-century Archdiocese was a tough crowd.

Energy oscillates, and as matter *is* energy, matter also oscillates. The electrons, protons, and nuclei that constitute all matter are themselves *systems* of oscillating energy fields. When these various *systems* come together to form sustainable patterns of oscillations, they create a new *system*, the atomic structure, which is a high-frequency oscillating energy grid. For example, a *system* of the nucleus oscillates at ~10^{22} Hz. The *system* of an atom (at 70 °F) oscillates at ~10^{15} Hz. An entire molecule, which is a *system* made of *systems* made of *systems*, oscillates at ~10^{9} Hz, and so on[48]. The key ingredient as to what makes a *system* is the sustainability of the oscillations and the internal forces that hold it together. More significantly, these oscillations and forces determine how it will integrate and interact with other systems in its environment. A real-world example of this is how viruses and bacteria can be killed with simple inharmonious frequencies from oscillating electric fields[49]. Another example is how the Earth is the distance from the Sun because of the speed it travels. If the Earth slowed down, the distance would increase, and if it sped up, the distance would decrease. A pattern that controls frequencies of planets in our solar system is Kepler's 3rd law, $T^2=a3$, or the *orbital-period-in-years*^{2} = *semi-major-axis-distance-in-AU*. Suppose a new planet enters our solar system. In that case, it will either find its (hopefully unoccupied) orbital frequency according to this pattern, be tossed out into space, or be sucked into the sun.

Key 32: Oscillation enhances sustainability.



(Image from Grant Sanderson's video "But what is a Fourier series? From heat flow to circle drawings". [50]

More abstractly, everything we can see, hear, and touch can be described as a collection of oscillations. This was proven by the famous French mathematician Joseph Fourier (1768–1830) during his study of heat transfer. From his work came the famous and brilliant *Fourier Series* and *Fourier Transformation*. The Fourier Series describes the hierarchical order of frequencies that would be needed to produce a specific output. For example, the image above shows a portrait of Joseph Fourier being drawn by a pen at the end of a long series of oscillating circles, shown by the rotating arrows, each subsequent oscillation originating from the tip of the previous circle's arrow. The Fourier Transform is the math that can reverse engineer some collection of oscillations, such as music or a painting, and discover the recipe of its various frequencies and their quantities. By extension, this can also apply to 3 (or more) dimensions.

Newton's 2nd law of motion

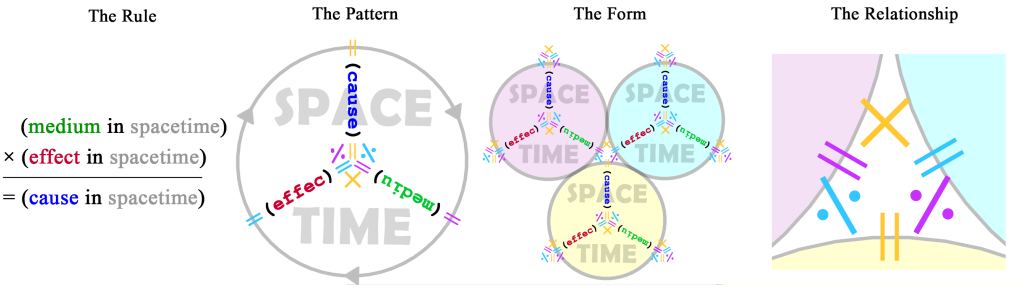
There are a lot of universal patterns and laws, for example, the *Harmonic Series* that describes music, $\frac{1}{1}\frac{1}{2}\frac{1}{3}\frac{1}{4}\frac{1}{5}\frac{1}{6}\frac{1}{7}\frac{1}{8}\cdots$, the *Fibonacci Sequence* of (0, 1), 1, 2, 3, 5, 8, 13, 21, 34..., how prime numbers can create π, $\frac{1}{1}-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\frac{1}{9}-\frac{1}{11}+\cdots=\frac{\pi}{4}$, and ratios and constants like *Euler's number* (*e*, 2.71828), *Phi* (Φ, 1.618) and *Pi* (π, 3.14159). Many instances share these foundational patterns, and while these instances may not have a direct connection, they do share properties of these laws and patterns. We don't say a basketball is the same as a planet, but we do say they are both round, and anything we can say about roundness applies to both. This may sound childishly simple, but when this is applied to the 2nd law of motion, we see some fascinating patterns and relationships.

Newton's 2nd law of motion was the brilliantly simple and profound formula of ***force=mass × acceleration***, or ***F=m×a***. This law seems so intuitively obvious that it borders on silly. We all know that getting hit by a baseball thrown by a little league pitcher might leave a mark, but one thrown by Aroldis Chapman of the Cincinnati Reds might be fatal (Chapman holds the world record of the fastest pitch in history at 105.1 mph in a game against the San Diego Padres on September 24, 2010). The genius of this formula was not just its simplicity but that it could be proven that it was as universal as 6=2×3 and therefore applied to baseballs as well as the planets, ushering in a revolutionary change in the world view at the time… a world view that others, like Giordano Bruno and Galileo, were burned at the stake or tossed into prison for simply suggesting.

Let's take a big step back for a moment. Energy is what causes things to move. When energy moves, it affects things that it interacts with. We can see this when we drop a rock in the water. The energy of the falling rock interacts with the water to cause waves to spread out, and we can see how those waves interact with other things, such as the shore. With each interaction, the energy is transferred, spread out, shared, until all the energy in the wave has been dissipated and balanced within the *system*, i.e., the body of water, thanks to entropy.

This simple example can be abstracted into 3 basic concepts: the ***cause*** of movement, the ***medium*** of movement (e.g., mass, electricity, water, etc.) , and the ***effect*** of movement (on that medium). ***Cause***, ***medium***, ***effect***; these are the properties of the archetypes whose relationships to one another can easily be expressed in the values 6, 2, and 3, respectively. The 2nd law of motion tells us that ***mass (2) × acceleration (3) =force (6)*** , which implicitly tells us that ***medium (2) × effect (3) = cause (6)***, but there's an obvious yet unspoken property that is fundamental to all 3 properties; ***time***, or more correctly, ***space-time***, as time and space are inextricably bound.

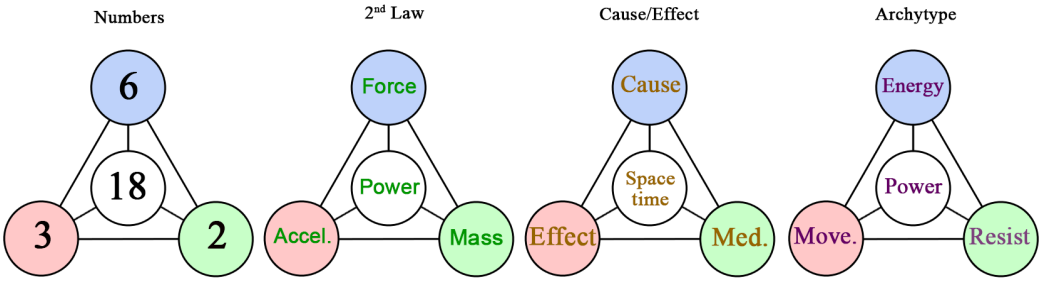
When we diagram this relationship (illustrated below) in its simplest form, we can see the natural pattern formed by the relationships between the different instances of energy. We can also see how this pattern will self-assemble itself into a form based on the inherent patterns and relationships. In this case, the relationships are simple math functions (×, ÷). These functions are themselves patterns, or stable concepts, of the integration of *parts forming a whole* and the disintegration of *a whole formed of parts*. This is why the integration of multiplication (and addition) is bidirectional (i.e., 2×3=3×2), but the disintegration of division (and subtraction) is one-way (2/3≠3/2). This is 2nd grade level math, but it is also the pattern that describes how reality functions, how parts become wholes and wholes become parts. The ancient Greeks were exceptionally well versed in these patterns, but it wasn't until the16th century that Newton applied them to the physical world, bringing us Newton's laws, and with them, the modern era of mechanics, physics, relativity, and quantum theory, all of which are based on Newton's 2nd law of motion, which is based on the pattern of 2×3=6.



This is why the same pattern appears in a number of contexts, as shown in the image below, and when seeing these properties in these different contexts, less obvious relationships become clearer. For example, we see that ***cause*** results from combining ***effect*** and ***medium*** while ***effect*** is the result of separating ***cause*** and ***medium***. We also see how there is no rational way to explain a ***First Cause*** given that a ***cause*** requires an existing ***effect*** and ***medium***. That does not mean there was not a ***First Cause***, just that if there was, it defies reason.

This pattern also suggests that the ***First Cause*** could have emerged from an ***effect*** and ***medium*** *outside* our reality, as per Sidis' idea or the theory that Big Bangs, which create new universes, are actually taking place *inside* a black hole, which, being a maximum state of high-entropy chaos, is *outside* of the Universe that is created by the Big Bang. Our self-assembled triple-circle pattern agrees, as it quite clearly shows that the ***cause*** in one space-time system was created by the merging of the ***medium*** of a space-time system with the ***effect*** of a different space-time system to create the ***cause*** of a child space-time system.

Here we can see how the model that applies to numbers, motion, and cause and effect *could* also apply to the creation of our particular space-time Universe. We stress the word "could" as this is not a theory, hypothesis, or even a glimmer of a faint idea in the world of science, as far as I know, but it is a model that fits the larger patterns of creation, so, who knows?



Another way to look at this is that the ***First Cause*** is *nothing*. We see this in math in the way that 1 is the effect of 0 because the creation of a concept of nothing demands the creation of a concept of something, or so we are told by philosophers, mathematicians, and physicists[51]. Numerically, this makes 0 the ***First Cause***, but it seems contradictory that *nothing* can be the ***First Cause***, at least in the material world. It might make sense if we consider the inside of a black hole as a form of 0 and the singularity that forms within that nothingness as a form of 1… It's just a thought…

We have seen the 2/3/6 relationships and how they match the ***cause***/***medium***/***effect*** relationships, but there is a 4th property of ***space-time***. How does that fit into the 2/3/6 pattern? To know this, we have to first determine the value of this new ***space-time*** element. Fortunately, this is simple to determine as that value has to be the smallest value that all other elements contribute to, and that value is 18, which, being 6×3, fits perfectly. 6×3 equates to ***force*** × ***acceleration*** or ***cause*** × ***effect***. And what does ***force*** × ***acceleration*** equal? ***power***. ***Power*** in this context is defined as "*the rate at which work is done, or energy is transferred in a unit of time*". But wait, isn't that what ***force*** is, ***energy*** over ***time***? Yes, but how much energy over how much time? If it takes me an hour to climb 6 fights of stairs, it requires ***force*** over ***time***, but not much power. If I ran up 6 flights of stairs in 15 seconds, that would also be a ***force*** over ***time*** but a lot of ***power***. ***Power*** is a measure of force, and in the world of electricity, this is called ***watts***. A 100-watt bulb has the same force moving though it as a 1-watt bulb but 100× faster. Another analogy is how a penny is money. A wheel barrel of pennies is also the same money, but it has a lot more buying ***power***. In the physical world, this is called ***pressure***. What do we call it in the archetypal world where ***force*** × ***acceleration*** is expressed as ***cause*** × ***effect***? We could still call it ***power*** or ***pressure*** as the definition remains the same because ***cause*** × ***effect*** is still describing the transference of energy, but now with the property of ***space-time***. In practical terms, ***cause*** and ***effect*** alone, with no regard for the medium or context where things are happening, *is* the ***power*** of this reality, as it is what makes everything happen in this reality. The ***medium*** will determine the instances of that ***power***, but it is still the same ***power***.

Another context where this law works very well is electricity where the 3 states ***cause***, ***medium***, and ***effect*** are instance of ***volts (V)***, ***resistance (R)***, or ***ohms*** and ***current (I)***, or amperage. In the electrical world, these relationships are called *Ohm's law*,

and just as the 2nd law of motion, ***F=m×a***, tell us that "*movement is proportional to pressure and inversely proportional to mass*", Ohm's law, ***V=R×I***, tells us that "*electric current is proportional to voltage and inversely proportional to resistance".

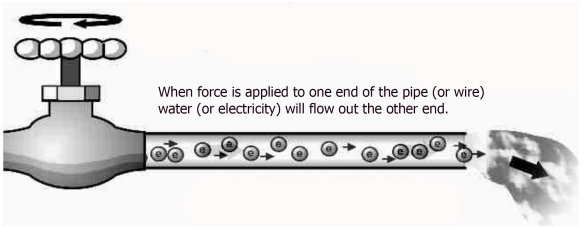
The world of matter and electricity share these same qualities in the following ways:

Domain		
Matter	Electricity	Archetype
Force	Voltage, Electromotive Force	Cause
Mass	Resistance, Ohms	Medium
Acceleration	Current, Amperage	Effect
Power	Power, Watts	Time

Force equates to **voltage** (which is technically called *electromotive force*). Both are of the archetype of **energy**. **Mass** equates to **resistance** or **ohms**. Both are of the archetype of **medium** or **resistance**. **Acceleration** equates to **current** or **amperage** (movement of electrical charge). Both are of the archetype of **effect**. Mechanical **power** equates to electrical **power** as both represent how much energy is transferred in a unit of time, and both are of the archetype of **time**.

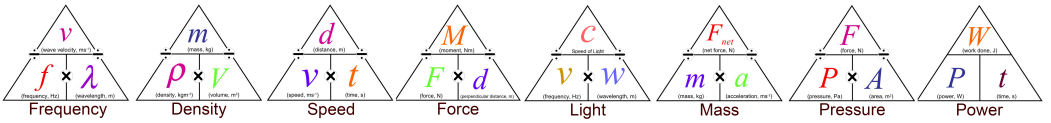
The commonality of this law is why we can describe the concept of electricity flowing through a wire as water flowing through a pipe.

- **Power (P)** is the rate or measure of water that is being transferred.
- **Current (I)** is the amount of water flowing through the pipe.
- **Voltage (V)** is water pressure, which determines how far the water shoots out of the pipe.
- **Resistance (R)** is represented by the size of the pipe the water is flowing through.



As we move from context to context, such as matter to electricity, these 3 properties are defined, measured, and interact in different ways, but the law does not change, and with a little analysis, it can be shown how these different properties relate across many contexts. [52]

Here a just some of the common contexts where this law applies:



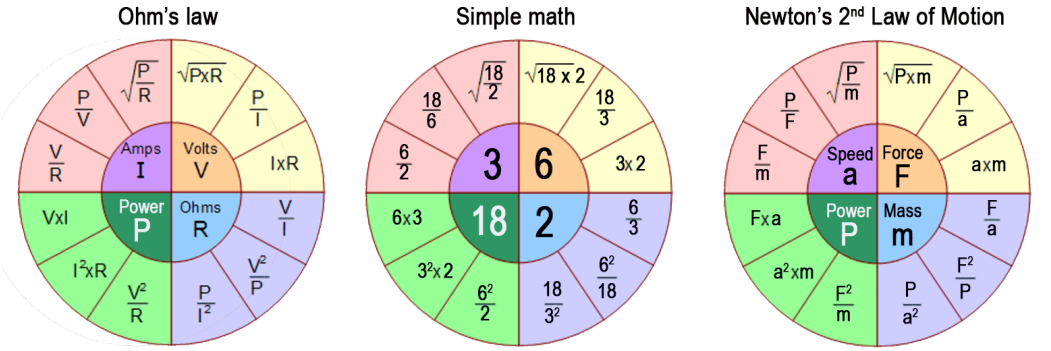
The trinity of order

For the record, Ohm's law is an instance of what is called the *lumped element model*, which approximates a system's behavior without knowing the complexity of the underlying systems. In the case of electricity and Ohm's law, we don't need to use the partial differential equations to calculate the Lorenz force to know how many amps the refrigerator needs. We only need to calculate **I=V/R** (amps = volts/resistance) to know how many amps the fridge uses, rather than $\oint \vec{B} \cdot \vec{ds} = \mu_0 i + \frac{1}{c^2} \frac{\partial}{\partial t} \int \vec{E} \cdot d\vec{A}$.

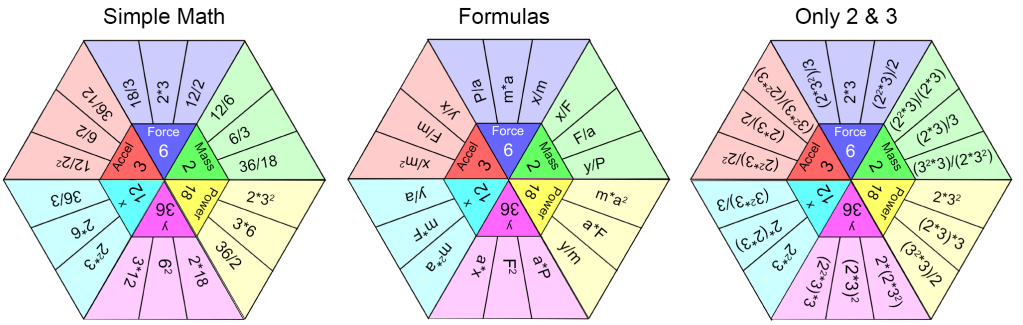
We saw in the image above titled "*The Pattern*" that energy has 3 states through which it can interact with all other forms of energy, those being **cause**, **effect**, and **medium**. It does not matter if the energy is from a volcano or the flipping of a coin; these 3 states will always be the same. It's similar in practice in how the standardized electrical outlets have 3 inputs that work the same no matter where you are or what you plug into them, regardless if the energy comes from a coal plant or nuclear power. Or, think of a radio's power button, volume control, and tuner. No matter their form, they work regardless of what's inside the box, be it tubes, coiled wires, or integrated circuits. Newton's laws are the "universal standard" for the mechanical functioning of this part of reality we exist in, but only "this part" of reality. By "this part", we mean a reality that isn't near a black hole or an enormous mass that distorts spacetime, isn't too hot or too cold, and where typical "things" are not too big or too small. Newton's laws are valid in the middle of the Bell curve where there's more order and stability… which is why we exist in that zone as well, and probably why anything we discover as to the true nature and meaning of life is only valid for the zone we live in.

The Patterns

Below are 3 tables that compare Newton's 2nd law of motion, the simple math it is based on, and Ohm's law.



If we look closely at these formulas, there appear to be at least 2 that are missing. We can see that there is a *6×3=18* which is ***cause* × *effect* = *power***, but where is *6×2=12,* which is ***cause* × *resistance* = *?***. And where is *3×18*, or ***effect* × *power* = *?*** What happens if we add them in with the other formulas just to see what all the formulas would look like together? This is shown below with the new values creatively named *x* and *y*.



This looks quite different now. This hexagonal model also shows quite a bit more symmetry and pattern than the classic cube or circle model, and is even self-similar or fractal and has a few other interesting qualities. For example:

- The bottom values of 12, 18, 36 are the top values of 2, 3, 6 multiplied by 3
- The only value that exists as the square of another value is 36 (*force*^{2}).
- The sum of all the set of top values (2, 3, 6) equals 11, which crosssums to 2 (*mass*), the smallest value of the set and the first of the two prime numbers, and the set of bottom values (12, 18, 36) sum to 66 (*the-crosssum-of-top-numbers*×*6*), which crosssums to 12 (*x*), the smallest of the set, and when crosssummed again gives 3 (*acceleration*), the second of the two prime numbers. The crosssum of all the numbers gives 77 (*the-crosssum-of-top-numbers*×*7*).
- Multiplying all the numbers together gives 279,936, which is *(2×3)*^{7}.
- Using the hexagonal model, we can arrive at all values using only multiplication and division, while the cube model requires square roots, which hides the greater pattern (described in ‘Family Values’ below)
- The traditional 4-part model has 24 (or *2×3×4*) possible relationships, but the 6-part model has 720 (2×3×4×5×6, the factorial of 6!, or *60×12*). Have you ever wondered why the ancient Sumerians chose 60×12 to divide the day and 60×12 to divide the night when they invented the standard of time we still use today?
- Many more interesting patterns that a numberphile could spend days discovering.

The reader may be thinking, “Sure, that’s what happens naturally with numbers. There’s nothing special about any of this.”, and that would be correct. Not only that, but the new *x* and *y* values do not tell us anything new from a mathematical perspective. When you do the math, you discover that *x* is always the same as ***mass*** (i.e., ***medium*** or ***resistance***) , and *y* is always ***force***^{2} (i.e., ***cause***^{2}) . OK, so then why are we even bothering with this? Because we are more interested in the pattern than the practicality of these extra formulas, and here we show that the *complete* pattern of the model that defines a fundamental law of reality is hexagonal in nature. This will prove to be an extremely significant detail.

Family Values

Are there only 6 laws? Yes, because 6 is the number of products (results) you get when multiplying any two values (factors) whose products equal a factor *and* where the product is divisible by both factors. For example, if we start with the factors 2 and 3, we can create the products 4 (2^2,) 6 (2×3) and 9 (3^2) but 4 and 9 are tossed because only 6 is divisible by both factors of 2 and 3, and are therefore not part of the 'family' of 2 and 3 (the bastards). Think of 6 as the child of parents 2 and 3, the 1st generation. Now we have a new factor of 6 that can create two more products, 18 (6×3) and 12 (6×2…math is very incestuous) and 36 (6^2). This is the 2nd generation. The total number of values, including factors and products, is now 6 in number (2, 3, 6, 12, 18, 36). In short, the total members of a 'family' that descend from both parents will always be the 2 parents plus 1 child for the 1st generation plus 3 (inbred) grandchildren for the 2nd generation, so that would be $2+1+3=6$ (for the curious, there are 19 for the 3rd generation). The reference to children, parents, and family for numbers is not an anthropomorphic metaphor I just came up with but was adopted from Pythagoras, Plato, and other ancient pioneers of math who took these associations very seriously. Pythagoras created an entire religion around math on the idea that only math is the one true source of knowledge[53], and many beliefs and customs were based on math. This seems odd, considering their gods were homicidal inbreeding maniacs, but it makes sense if the myths told the same stories of numbers and math but with a bit more drama.

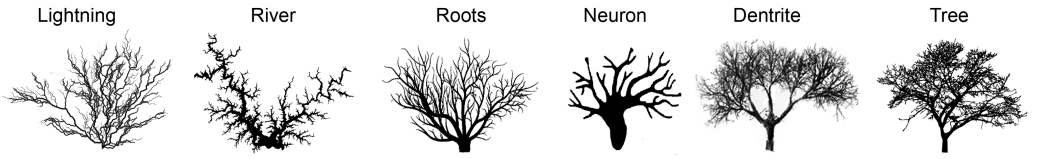
A word on electricity…

We are using Ohm's law, the laws of electricity, as an example for another reason as well. We are all familiar with lightning. Watching the bolts of light shoot instantly across the sky and into (or from) the earth is awe-inspiring and exciting. Contrary to the statement "Lightning never strikes the same place twice", lightning often strikes the same place many times, and for good reason. Ben Franklin suspected why, which gave birth to the lightning rod, saving millions of buildings from burning to the ground.

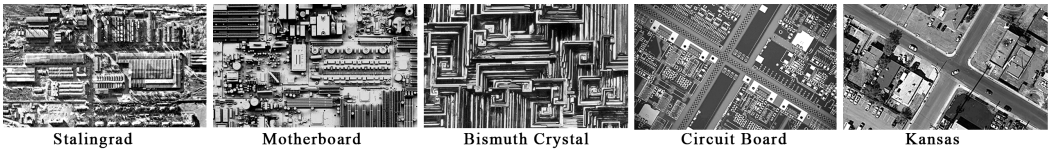
We know that energy always travels the path of least resistance, so we would say that the path of least resistance for lightning exists between a starting point in the sky and the ending point at a lightning rod (or wherever), and we know that this path was predetermined before the electrons traveled it. As the opposing charges of the earth and the sky increases, 2 fields grow - the positive field of the earth is pulled towards the negative field of the sky, and vice versa. When they touch, a path is opened, and all the excess positive charge rushes toward the sky, and the excess negative charge rushes toward the earth. They do so along a path that the fields have already determined. This is similar to how we know where the water from rain will flow because the paths of least resistance, which already exist, are easily identifiable. By the time we see the lightning, the fields have already balanced themselves. The engine of this interaction is the electrical fields. Lightning is the byproduct of their interaction.

This pattern created by the flow of energy across fields of potential created by the imbalance between energies can be seen elsewhere, such as in plants, rivers, brain cells, and so many other examples. Is it reasonable to apply the same logic and suggest that the patterns of roots and rivers are the paths of least resistance that energy travels and are themselves the byproduct, or effect, of interacting fields balancing

each other out? If so, what exactly *is* that energy that is balancing? It seems that the main difference between the pattern of lightning and the pattern of rivers, brain cells, plants, etc., are the energies at play, but energies that take years, centuries, or even the lifespan of the Universe to balance themselves out.



These bifurcated expanding patterns are ancient, primitive, and foundational in nature. As nature evolved, so did its patterns and the patterns created by its own creations. Perhaps our collective human intelligence is at the *crystallizing* stage of evolution, which for the Universe, was 4 billion years ago.



Newtons and Joules

Before we continue, it would be helpful to clarify how energy is measured, as this will come up a number of times.

The standard measure of energy is a joule. For example, it takes 1 joule to:

- Run a 1-watt light for 1 second.
- Raise the temperature of 5 drops of water (0.239 grams) from 0° C to 1° C.
- The energy required to accelerate a 1 kg mass at 1 m/s^2 through a distance of 1m.
- The amount of energy your body uses when sitting… 60 times a second, or the amount of energy needed to walk about 8 inches per second.

A joule measures the energy of a force. And what is a force? It's something that causes something to change. If you remember Newton's 1st law of motion, the law of inertia, it states that something that is at rest (floating or stationary) will stay that way until some external force is applied to it.

Newtons are the units used to describe force, specifically the force required to move 1kg 1 meter per second per second ($1m/s^2$). Imagine A pineapple (which weighs about 1kg) floating stationary in deep space. If it were to be pushed with a force of 1-newton, it would begin to travel at one meter per second. If the force was constant, it would accelerate $1m/s^2$, similar to the way things fall at a rate of $9.8m/s^2$ here on planet Earth. This is because gravity exerts a constant force (of 9.8 newtons) on a falling object. Because a newton is measured in kilograms, and gravity is ~10 newtons, something 100 grams sitting on a table, like a stick of butter, applies a force of

1-newton to the table. If you wanted to lift that stick of butter 1m above the table, you would need to apply a force of 1-newton to do so, no matter how long it took. If it took 1 second, then that is 1-newton/second. If it took 1 hour, that is 1-newton/hour.

It takes work to lift that butter, and work takes energy, so how much energy is expended to create that force to lift the butter? This is where joules come in, as *1 joule = 1 newton×1 meter*, or, the amount of energy needed to exert a force of 1 newton on an object to move it 1 meter. In the butter example, that energy would be 1 joule/sec or 1 joule/hour. Perhaps the closest commonplace concept to this energy/time/space relationship is the old-fashioned measure of horsepower. HP was created to compare the work of a steam engine to that of a horse. If a steam engine could lift a ton of water 1 foot in 1 minute, and it took 4 horses to do the same, then the engine had 4 HP. This is the same concept behind joules/second, as 1 HP = 745.70 joules/sec. The Pontiac GTO, a classic muscle car from the 60s, boasted a 300 HP engine, which is equivalent to 223,710 joule/sec.

To sum up:

- Newtons measure the force needed to cause a change.
- Joules measure the energy expended on that change.
- Joules/sec (or HP) measures the energy of change over time.
- Newtons only apply to mass, so this is how we measure things like angular momentum, the force of the planets in orbit, and also how we measure the spin of elementary particles.
- For things that are not mass or refer to the energy rather than the force of mass, we would use joules.

$E=mc^2$

There's one more pattern comparison to look at. In the formulas above we can see how the pattern of $18=2\times3^2$ ($P=R\times I^2$) looks exactly like another popular formula: $E=m\times c^2$. Using the rational and analogous associations, we can equate:

- ***E*** (energy) to ***P*** (power)
- ***m*** (mass) to ***R*** (resistance)
- ***c*** (speed of light, *not* c^2) to ***I*** (current)

We can successfully recreate all 12 formulas from this one equation, making $E=mc^2$ yet another context for this universal pattern. However, a new value that equates to volts or force has appeared. We'll call these **zvolts** for now as they correlate to electrical volts using Ohm's law formulas.

An interesting observation is how in this context, the variable for *speed* or *current* is *c*, the speed of light, and therefore must always remain constant. It looks like *c,* which is Relativity's version of *current*, or amperage, is the *maximum current supported* rating for this universe, not unlike a 40 Amp fuse we use to ensure we do not melt

our wires and burn out our devices. Does this suggest that if we break the speed of light, we would “blow a cosmic fuse” and “melt” our reality? Maybe we’ll find out one day.

But what, if anything, are these **zvolts**? In the world of electricity, voltage is described as *electric pressure* that results from the difference that exists between two states, one being the highest potential energy (like the storm cloud or mountain top), and the other being the lowest potential energy (like the lightning rod or valleys). In the world of matter, force is the source of pressure that causes change to an object. Can we then say that these missing cosmic volts represent some measure of pressure or force that creates the movement of energy like some sort of relativistic version of volts or forces?

Let’s calculate the value of a zvolt. If $z=c\times m$, and c is 300,000,000 meters per second, and m = 1 gram, then $z=300{,}000{,}000$ *m/s per gram*. If $m=0$, then $z= 0$. If $m=2$ then $z=600{,}000$ *m/s per gram*. So, what is this number? We know that the energy that is needed to move 1 gram 1 meter is 1 joule, so to move 1 gram 300,000,000 meters, you need 300,000,000 joules, and to move 2 grams 300,000,000 meters, you need 600,000,000 joules (or 600 megawatts, or 2,682 Pontiac GTOs all traveling at 120 mph). So, zvolts are joules, which matches perfectly as joules are the energy behind force, and volts are an electrical force.

Alchemy

This might seem like an odd place to switch to the subject of alchemy, but it is not, as you will see.

Suppose we claim that these laws and patterns were seen throughout our journey of discovery over the past millennia. In that case, we should be able to see them in the early forms of reasoning that evolved into such things as modern science.

Alchemy is the birthplace of modern science. Despite the charlatans of science of the olden days, just like today, many alchemists profited by promoting “elixirs of life” and promises of discovering the “philosopher’s stone”. The true goal of alchemy was to discover the secrets of nature, and to alchemists, this was as much a spiritual journey as it was a technical one. Modern science has done away with the spiritual or mystical aspects of knowledge and doubled down on the technical aspects (which we will discover is an unsustainable position).

We can see early forms of these modern concepts, specifically in the concepts of the elements of earth, water, air, and fire. These elements do not refer to the material instances but to their archetypes, of which the material forms are limited instances of. The first form of matter that came into existence, which would be the equivalent of modern science’s soccer-sized ball of everything that exploded to fill the Universe, was considered to be formed by these four archetypes. This was an idea held by the ancient Greeks, Islamic philosophers, scientists, and learned Asians and Europeans of their day.

As archetypes, they did not only instantiate as matter but also as qualities. For example, the elements were used to describe health as far back as Hippocrates (400 B.C.) and as recently as Carl Jung's theory of personality, which drew heavily on Hippocrates. In Jung's theory, there were 4 types of personalities: feeling (fire, choleric), thinking (water, phlegmatic), intuition (air, sanguine), and sensation (earth, melancholic). He then added the attributes of introversion/extroversion to come up with 8 basic personality archetypes.

This is relevant here because the 4 alchemical elements are a very early version of the 4 qualities of matter as expressed by Newton's 2nd law. It might seem odd or even ridiculous to compare perhaps the most significant laws of technical thinking to the hocus-pocus of alchemy. Still, Isaac Newton was himself an alchemist[54] who not only attempted to turn lead into gold but believed he could discover the Elixir of Life. In fact, Newton was feared by the English Crown because if he did discover the Philosophers Stone, that magical element that could turn lead into gold, he would ruin the British economy. Newton also feared the Government as they imposed very severe penalties on anyone trying to turn lead into gold, so none of his alchemical works were published.

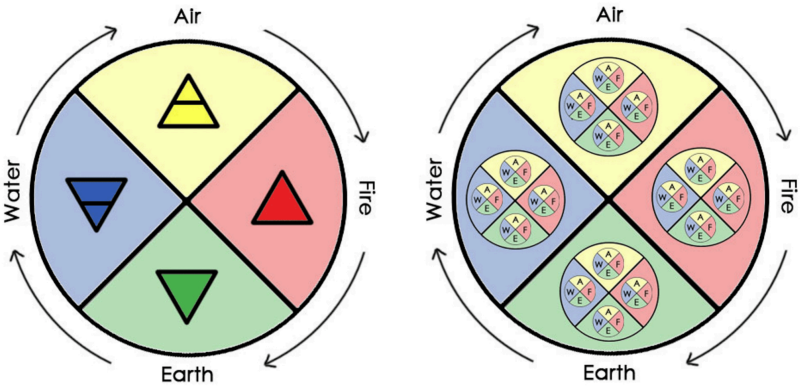
Newton's alchemical work was only discovered in 1936. When his manuscripts were auctioned by Sotheby's, it was discovered that one-third of his work was alchemical, and even more surprising, was as meticulously researched as his technical work. This does not include his religious writings, such as the 323-page "*Observations upon the Prophecies of Daniel, and the Apocalypse of St. John*", or the volume of work that predicted that the apocalypse and return of Jesus would take place in 2060.

Newton was a secret member of the heretical Christian sect called *Arianism* (after the 4th century Alexandrian Arius) that did not believe in the biblical doctrine of the *Trinity of God*, but rather the *Oneness of God*. This belief was punishable by death according to Oliver Cromwell's Blasphemy Act of 1697, so we can safely speculate that a lot of Newton's research was kept hidden, and will probably never been seen.

Considering that 20 years of his work was destroyed in a fire started by his dog, one-third might be a very conservative number. These works were labeled "not fit to be printed" by the King after his death for fear someone would pick up where he left off. Today, we have hundreds of years of science to base our thinking on, but before Newton and his laws, there was only alchemy, and this is what Newton studied, along with occultism and hermeticism. Modern science is loath to admit that Newton was as much a 'magician' as he was a scientist, but there is no doubt his esoteric studies had an impact on his theory of forces and gravity.

Historical note: Newton may also have been a bit mad as modern analysis of his hair showed elevated mercury levels, and in 1692-1694 he wrote letters that certainly sounded mad, accusing John Locke of attempting to "embroil me with woman", and dropping out of contact; "I am extremely troubled at the embroilment I am in, and have neither ate nor slept well this twelve month, no have any former consistency of mind… I must withdraw from your acquaintance, and see neither you nor the rest of my friends any more." But this madness didn't stop him from publishing his masterpiece of experimental physics, "Opticks", in 1704.

What we understand as resistance, current, volts, and power (or mass, velocity, force, and power) today, the alchemists would describe as qualities that have the properties of earth, fire, air, and water archetypes, respectively. This is not to suggest that just as $F=m\times a$, so too does $air=earth\times fire$, but we could easily draw parallels of both concepts like movement, energy, force, and resistance. These different models are examples of how the same patterns and archetypes keep appearing across many contexts and scopes, such as technology, science, mysticism, social order, biology, and many more. In Newton's case, they formed his understanding of reality that was then applied to his laws. It seems reasonable to assume that Newton knew of the hexagonal pattern of his laws, but he had no reason to speak of any but the most technically useful. It may also have been that he chose to keep certain information and discoveries away from the watchful eyes of the nervous king and a pope who saw him as a potential heretic. This, of course, is pure speculation.



Images from http://elements.spiritalchemy.com

Key 33: Instances of laws are limited, defined, and understood according to their context.

Quality of Numbers

Related to concepts of reasoning is how we look at numbers. Typically, a number is a quantitative value; we have 6 apples, $1,000, etc., yet having 6 apples says nothing about the apples themselves. This lack of qualitative meaning in numbers is at the core of the ongoing debate in the world of statistical analysis. Imagine the differences in approach and perspective between a quantitative understanding of overpopulation vs. a qualitative understanding.

For clarity, here is how we understand the concepts of *quantitative* and *qualitative*:

- **Quantitative** data can be counted, measured, and expressed using numbers. Quantitative data has an objective agreed-upon value.
- **Qualitative** data that is descriptive and conceptual. Qualitative data can be categorized based on traits and characteristics.

Lay persons tend not to think of numbers as having qualitative properties. How would you describe the number 1? Most people would not say, “It’s that number which, when multiplied by anything, has no effect”, or “It’s its own square root”. When you see the number 7, how often do you think, “I wonder why its inverse is an infinite recurring pattern of all the numbers not divisible by 3, yet add up to $3^3 \times 3$?” (1/7=0.142857 142857 142857 142857 and so on). In ancient times, numbers were far more qualitative; Greeks considered 3 the number of man, 2 of woman, and among the Pythagoreans, 9 was too sacred a number even to be uttered. Of course, most qualitative values of numbers will be cultural, which doesn’t mean they are invalid but are only valid within that context, such as how Plato and Socrates, both eugenicists, believed in the qualitative values of numbers when it came to breeding. Plato even went so far as to suggest that people should only be allowed to listen to certain music based on its harmonics.

However, numbers have a universal or objective, qualitative value regardless of culture or beliefs. The Oxford English Dictionary defines the word “unity” as “*The abstract quantity representing the singularity of any single entity, regarded as the basis of all whole numbers;* ***the number one.***”

Take the number 2, for example. It is the first pair, and it can be said that “*2 represents the result of two separate things joining to create a new separate thing, the first union*” (we saw an example of this in “Family Values”), or “*It allows us to define an area, which requires 2 dimensions*”. We can say 3 represents the most stable shape, as the simplest shape that can be created requires 3 sides, or the most stable form is a tripod. From these qualitative properties, we can speculate on the qualitative properties they contribute to the values they can create, such as 4, 5, 6, 7, etc.

Further on, when we explore relationships that can be expressed in numbers or geometry, we will often consider their qualitative significance because to ignore it would be to ignore an entire dimension or perspective of understanding.

Redundancy

The oscillation constant also gives us a glimpse into another fundamental yet profound property of creation and reality: self-similar redundancy. *Self-similar redundancy* (a term that is itself redundant) is how one property or law manifests itself across different orders of scale in the most effective manner given its context, state, and scope.

One of the more obvious examples of this type of inter-scope self-similarity might be the commonality between a solar system’s structure and an atom’s structure.

Of course, universal laws, such as the laws that describe the conservation of energy and mass, apply to all systems. At the atomic level, we also have local laws such as electron energy levels, the nuclear weak force, etc. In much larger systems, like a solar system, there are local laws of planetary motion.

Some scientists perceive no relationship between atoms and solar systems and claim that this analogy depends on an old and outdated concept of the atom, writing it off as humanity's tendency to oversimplify the complex and over-relate the unrelatable.

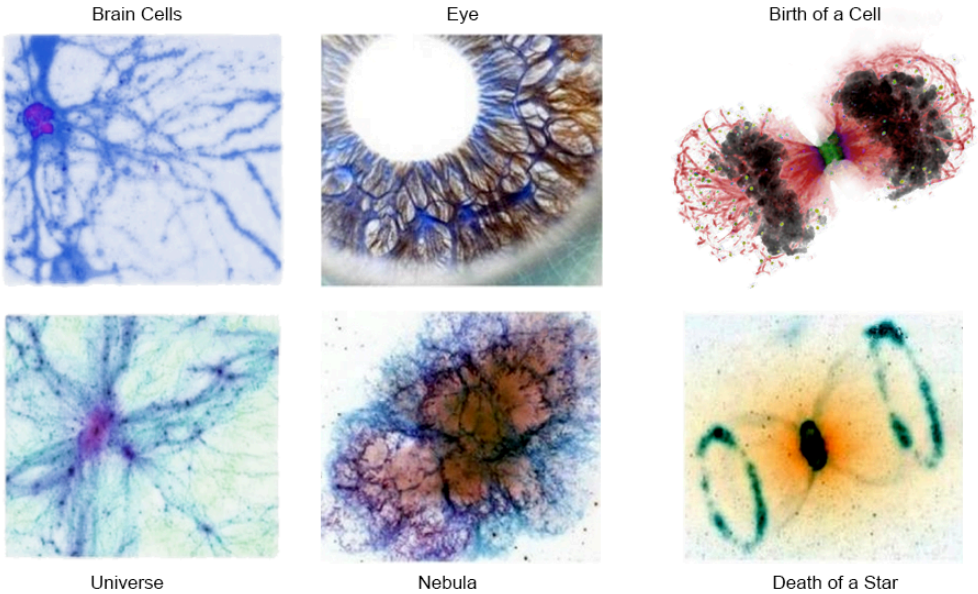
No doubt this is true to some degree, but more importantly, there are some similarities worth investigating that would give us an idea of the laws that both systems deploy in the most efficient way they can be expressed, given their scope. A perfect example of this can be seen in the field of *molecular dynamics* where atoms are treated as tiny balls, and the bonds between atoms are treated as mechanical springs. We know atoms and bonds are not balls and springs, but applying Newton's laws to these pretend objects results in accurate predictions.

Naysayers notwithstanding, this idea of self-similarity across scopes is legitimate enough to be studied and named. Quoting from the *International Journal of Theoretical Physics* [55]:

This report concluded:

> *The simplicity of [the Self-Similar Cosmological Model (SSCM)] and its ability to quantitatively relate atomic, stellar, and galactic scale phenomena suggest that a new property of nature has been identified: discrete cosmological self-similarity. Although the SSCM is still in the early heuristic stage of development, it may be the initial step toward a truly remarkable unification of our considerable but fragmented physical knowledge.*

A more organic example of this inter-scope self-similarity [56] is to compare the structure of the Universe to a brain cell, the birth of a cell to the death of a star, or the human eye and a nebula, and countless other examples.



There are many matching patterns between cells and the Universe, and it is a subject far too broad to get into here. One recently published paper[57] shows the similarity in structure of a neutron star and a human cell. Other comparisons based on scientific and rational observations have also been noted, such as:

- Mitochondria vs. stars.
- Vacuoles vs. galaxies.
- Nuclear holes vs. asteroids.
- Vesicles vs. Earth itself.
- Lysosomes vs. dark-energy.
- Endoplasmic reticulum vs. wormholes.
- Cell membrane vs. edge of the Universe.
- Ribosomes vs. molecular clouds.
- Smooth endoplasmic reticulum vs. the Sun.

One could say that if you look long and hard enough, you can find relationships and patterns between any two things. That may be true, but if certain patterns keep popping up, it might be more than just an overactive imagination.

It might even cause some incurably curious researchers to wonder if there was a bigger picture that they have been ignoring and inspire them to do some investigation that might open new doors of understanding… someone like the esteemed Stanley N. Salthe, Professor Emeritus, Brooklyn College of the City University of New York, who said:

> *It is an interesting possibility that the 'power laws' followed by so many different kinds of systems might be the result of downward constraints exerted by encompassing supersystems.* ***~ Stanley N. Salthe, Entropy 2004, 6, 335***

Here is what Hans van Leunen, a physicist from the Eindhoven University of Technology, Dept. of Applied Physics, and founder of *The Hilbert Book Model* project, which applies mathematical test models to investigate the foundation of physical reality, has to say about this as well:

> *Obviously, physical reality possesses structure, and this structure founds on one or more foundations. These foundations are rather simple and easily comprehensible. The major foundation evolves like a seed into more complicated levels of the structure, such that after a series of steps a structure results that appears like the structure of the physical reality that humans can partly observe*[58]*.* ***~ Hans van Leunen, The Structure of Physical Reality***

He then goes on to say:

> *The [paper 'The Structure of Physical Reality'] applies the name physical reality to comprise the Universe with everything that exists and moves therein.* ***It does not matter whether the aspects of this reality are observable. It is even***

> ***plausible that a large part of this reality is not in any way perceptible.*** *The part that is observable shows at the same time an enormous complexity, and yet it demonstrates a peculiarly large coherence.*
>
> *The conclusion is that physical reality clearly has a structure. Moreover, this structure has a hierarchy. Higher layers are becoming more complicated. That means immediately that a dive into the deeper layers reveals an increasingly simpler structure. Eventually, we come to the foundation, and that structure must be easily understandable. The way back to higher structure layers delivers an interesting prospect. The foundation must force the development of reality in a predetermined direction. The document postulates that* ***the evolution of reality resembles the evolution of a seed from which only a specific type of plant can grow. The growth process provides stringent restrictions so that only this type of plant can develop. This similarity, therefore, means that the fundamentals of physical reality can only develop the reality that we know****.*

In other words, he is saying that there are self-similar and redundant orders in the *hierarchy* and *layers* (in his words) of creation, and these orders abide by specific laws which are limited (*predetermined*) by their component parts (*seeds*). Likewise, the restrictions of the growth process will be similar at every level, and consequently, the laws at play will be similar.

Key 34: Reality is a structured hierarchy of dualities that starts out very simple, each specific generation limited by the structures of the duality they emerged from.

You can read his paper[59], but unless you know your way around multidimensional Hilbert space lattices, it will be challenging.

For purposes of this book, I am going to define a *scope* or *order of creation*, (or *level*, as Hans van Leunen would say) as that creative cycle from which an apparent order emerges out of a state of the apparent disorder defined by the limits of the duality it emerged from. I say “apparent” because I don’t want to suggest that there is disorder in a seed and order in the resulting flower. Obviously, there is order in both, but the explicit order of a flower in bloom, at the peak of its expression, when it is ready to drop its seeds, is far more apparent than the implicit order of a seed. The flower is *explicit* when it is in bloom, and *implicit* in the seed, while the seed is *implicit* in the flower. This also suggests that within the scope of the life cycle of a flower, which begins with a seed and ends with compost, the flowering stage represents the most optimum expression of energy or the most effective form that instance can realize.

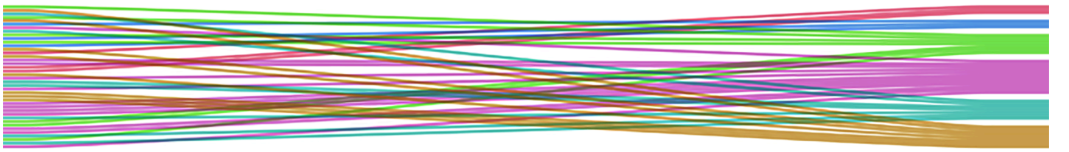
Key 35: Self-similarity exists due to the redundant nature of the laws that express themselves according to their context’s scale and scope.

5: REASON

The ability to understand something is limited by our ability to perceive something. As our perception changes, so does our understanding change, and with that, the reasoning we apply.

Synopsis: *Reason is a universal archetype with local instances which produce order within limited scopes and contexts and is therefore limited to that context. Human reasoning is limited to, and changes with, human contexts and abilities, but it is in accord with the instances of reason and structure of the system it exists within. All movement, or "work" within these systems, being self-similar and redundant, is limited by these system's structure or reasoning. All movement is an act of energy balancing itself. Structure and the inherent reasoning of a system's structure exists only to facilitate that balance.*

Keywords: *energy, effort, reason, resistance, cycles, intention*



We arrived at laws through reason, and we humans are rather proud of that claim as we like to believe we invented reason, but we didn't. We did discover it, however, so at least we can take credit for being doggedly curious.

Reason is what we call our ability to recognize the natural processes that arise from the patterns of creation and is the product of intellectual survival, a skill we evolved to give us fang-less, claw-less, slow, soft, and chewy humans a fighting chance in the Darwinian battlefield… at least that's one theory.

To be fair, there has been a long-standing debate over whether mathematics and, by association, reason, was invented or discovered. One of the more solid debates is presented by leading astrophysicist Mario Livio in his article "Why Math Works" [60].

In that article, he refers to those who believe math was discovered as Platonists since Platonic archetypes include math archetypes, as math is a form of an idea. Livio gets into the idea that math is subject to the same evolutionary forces as species. Math that does not work quickly dies, never again to propagate itself into the mathematical "gene pool".

The same is true for any idea or theory. Ideas such as the *phlogiston* theory of fire and Descartes's theory of the motion of planets are examples of conceptual offspring that were quickly dispatched by the deadly and merciless hand of proof. It's a bit different on the social level, where we see failed political and economic ideologies that, although their ruin is inevitable from the start, they continue to pop up because, in the realms of ideology, proof is often eclipsed by belief, hope, power and mass hysteria.

A sounder argument that reason was discovered is that the systems we have created with our reasoning abilities, from plumbing to artificial intelligence (AI), have come to the same design conclusion as nature when faced with similar challenges, such as water distribution, blood cell design, language, etc. In the case of AI, armed with our rules of reason, it has repeatedly out-designed human solutions by mimicking nature. These improved solutions were derived by observing the situation and applying the laws of reason that we instructed the AI system with, laws that we derived from observing our reality. The fact that AI is coming up with solutions that not only exceed ours but are more in harmony with nature is pretty good evidence that the laws of reason are objectively verifiable and existed before humans arrived on the scene.

In any case, both sides can agree, for the most part, that math is the language man invented to describe the existing laws he discovered. Likewise, reasoning is the process man invented to describe the unfolding order of existence that he was capable of perceiving. This is a sufficiently satisfactory answer regarding math and reason, but reasoning generally has a lot more gray area than mathematics.

The Limits of Reason

Reason has been pretty effective in describing our reality, but it has its limits, at least in how we use it today.

For example, the traditional Law of Thought[61] goes something like this:

The **Law of Non-Contradiction** states: - “Nothing can both exist and not exist at the same time and in the same respect, or no statement is both true and false.”

The **Law of Excluded Middle** states: - “Something either exists or does not exist, or every statement is either true or false.”

The **Law of Identity** states: - “Everything is the same as itself, or a statement cannot remain the same and change its truth value.”

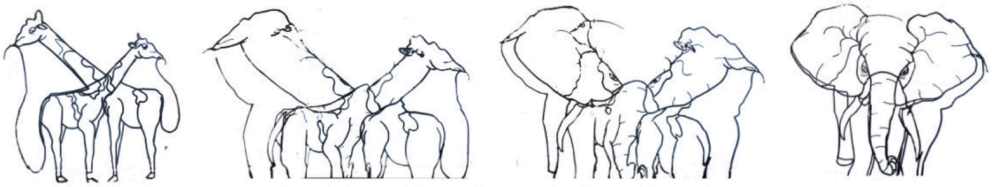
These laws are much like math and have their own algebraic notation: $\sim(p \cdot \sim p)$, $F(x) \supset F(x)$, $(\forall x)\ (x=x)$, respectively.

It seems reasonable to assert that these laws existed before we came up with a way to define them, just as natural processes existed before we understood them. We certainly did not invent the fact that something cannot “be” and “not be” at the same time. We discovered that this is a property of our reality, or rather, in the way we perceive our reality. If we broaden our perceptions to include the reality that something *can be* and *cannot be* at the same time, then our reasoning must adapt.

A hardcore Aristotelian materialist might say, “The law of non-contradiction specifically forbids something to be in a state of existence and non-existence. If something exists, it cannot be otherwise.”, while a Platonist might say something can exist as an archetype but not as a material instance. A scientist might suggest that something

can exist implicitly but not explicitly, like the ink drop, or can even be in two places at the same time, as we have seen in quantum mechanics, and a Hindu guru might mess everything up by saying, “The One from which all emerges is both *Sat* (existing) and *Asat* (non-existing)”.

It would appear that the laws of reason depend on the scope of one’s perspective and what one accepts as axiomatic or true, transcendental or otherwise. How, then, can these laws be preexisting if they contradict each other? This is sort of like the 2,500-year-old Buddhist parable of the *blind men and the elephant* where one blind man holding the elephant’s tail describes it as a snake, and the other, holding the foot, describes it as a tree, or perhaps like the brilliant sculptures of Mathew Robert Ortis, such as “Revolution Giraffes”, which looks like a giraffe from one angle, but an elephant from another.



"Revolution Giraffes" Sculpture by Matthew Robert Ortis

The blind men and the viewers of the sculpture are all perceiving a preexisting form that is undebatably “true”, but they can’t seem to agree on what it is. Each of these fine folks can easily define and defend their worldview. They can all recognize the reality they have accepted as true, supported by the reasoning of that truth.

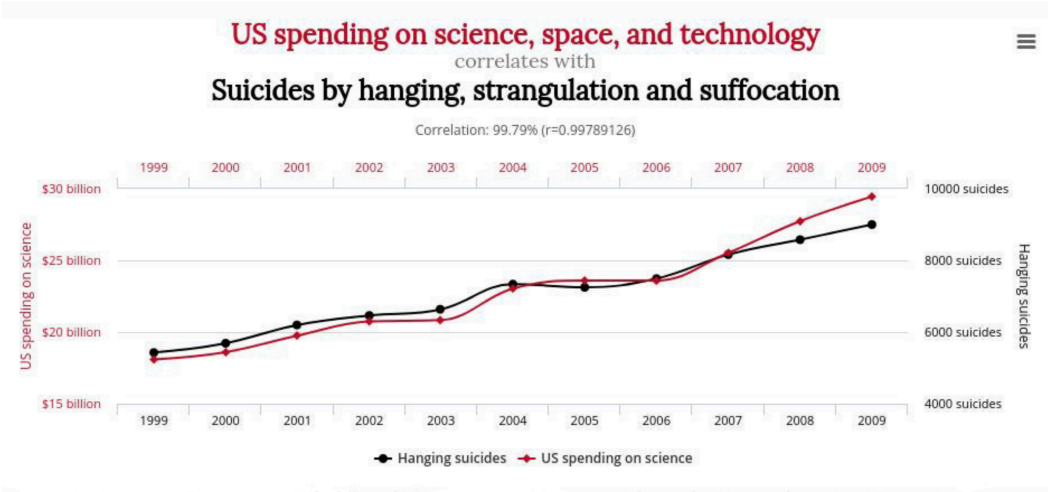
Labels and Names

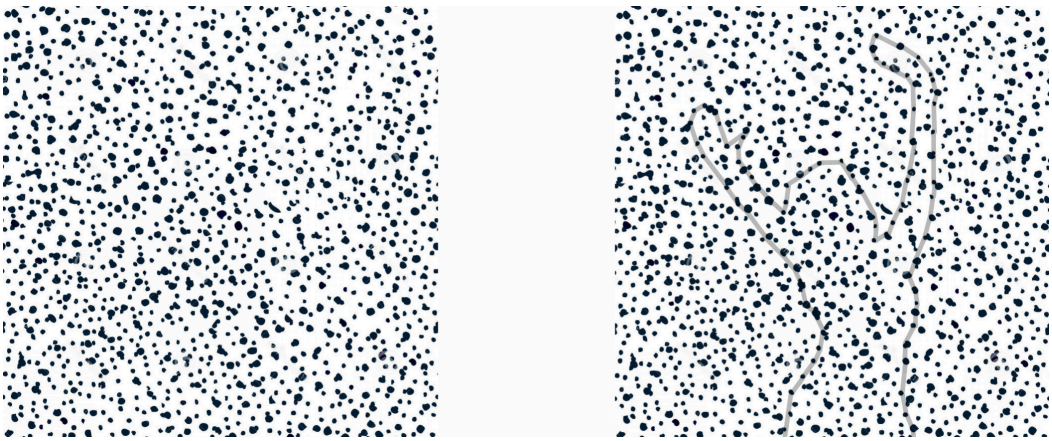
In all cases, before one can proclaim some thing’s existence, that thing has to be named, and something about it must be known or at least presumed. This claim is not only based on psychology but neurology as well. We can’t say something exists if we have no idea what it is we are making that claim about. We see this in how languages form ideas and labels, which become the foundation of cultural, social, and objective understanding. In some cultures, such as the Mayans, it is believed that things come into being by first being spoken of and named.

I can say my dog exists because I know *my* dog, I know *of* dogs, and everyone I know also knows of dogs. But can I say *phlimquitz* exists, and when you ask me what a *phlimquitz* is, I say, “I have no idea”? That would be quite unreasonable, but if I said *phlimquitz* explains the 99.97% correlation between “U.S. Spending on science, space and technology vs. Suicide by hanging, strangulation, and suffocation”, then I am claiming to understand something previously unknown and can go about defining and testing the *Phlimquitz Hypothesis*.

Key 36: We name things according to our observations, and once named, they become conceptual realities.

Here is that correlation, just for fun: [62]





This process of understanding is similar to recognizing a pattern in a series of random dots, as in the dancing-woman-in-the-dots example above (right). I can see a person dancing in that image, and I can easily prove it by connecting the dots. I am not wrong, but neither is the person who sees an egg sandwich.

This ability to recognize patterns exists in our neurology. However, predictions either of us makes as to where the next dot will land or in determining the properties and attributes of the dots, based on the understanding of our perceptions, will most likely fail. We will finally discover that these dots represent no specific pattern through trial and error, testing, and proofs. Once we recognize the concept of randomness, we can name it, define it, and study it.

Humans began grasping this concept of randomness about 3,000 years ago but named it things like “fate”, “chance”, and “destiny”, and, being unpredictable, it was usually associated with some sort of supernatural justice or punishment. It wasn’t until the 16th century that Italian mathematicians began to formalize the concept of what we call randomness, so it’s still quite a young concept.

Key 37: Our ability to reason is rooted in our ability to see patterns, and connecting these patterns is made possible by our ability to reason.

God(s), angels, spirits, the Djinn, magic, luck, coincidence, mystical forces, kundalini, chi, manna, out-of-body experiences [63], etc., are all concepts that many people have a clear understanding of. As such, they can say it exists because they can recognize it and produce reams of information about it. To be clear, this is not meant to suggest these observations are, or are not, as valid as any other. Any system’s validity depends solely on the contextual effectiveness of the reasoning behind it and the ability of that reasoning to produce verifiably accurate statements about it.

It would be hubris to write off alternative views of reality, given every culture in the world has a concept of some sort of paranormal or metaphysical reality. Western science icons, such as Paracelsus, Hippocrates, Plato, Carl Jung, Erwin Schrödinger, and Albert Einstein have referred to such realities. Many cultures have extremely demanding training and lengthy education necessary to understand and access these realities.

For better or worse, it seems that pretty much anything can be a Truth as long as people can recognize it and support it with whatever reasoning they use, even if that reason appears as madness. We need only look at history and some places on the planet today to see the many versions of truth that have evolved and how dramatically they differ from each other. For our purposes, we are only concerned with reasoning based on the laws of nature as they are perceived.

The Truth about Truth

This raises the Big Question; What is truth?

This is a question we can never answer absolutely. We can’t speak about the ultimate truth because there can never be absolute proof that any one way of looking at something is the “right” way. All we can speak about is what is the most reasonable understanding given the context of our reality and our perceptions of it. What, then, is the arbiter of proof as to whether something is “reasonably” true or not, given our current understanding of reality?

One referee is, of course, power. When Friedrich Nietzsche said, “There is no truth, only power”, he was half right. Truth is a journey of discovery that can lead down many roads, while power is a battle for who gets to navigate that journey.

Sustainability

Outside of that battlefield of culture and politics, we have at least one gauge, which is the measure of sustainability. Sustainability may be the best test as to the validity of something because its explicit existence alone is proof it exists in accordance with the rules of reality.

Anything that exists can only sustain its existence if it exists within the constraints of its scope, typically defined by its environment and component parts. A functional balance must be maintained between all contributing variables for the energy within that instance to move in a structured manner that allows order to emerge from chaos. Energy always seeks to achieve a balance; therefore, sustainability is the measure of the degree that order and balance can be maintained. Unsustainability will result in chaos and visa-versa.

Key 38: Sustainability measures the degree to which order and balance can be maintained.

This raises an interesting question: if (high-entropy) chaos is the ultimate state of the Universe, a state where everything is inert, motionless, and dead, then it must also be the most sustainable state as it will never change once arrived at. Oddly, this appears to be true, but this is also an example of the two kinds of *balance*. The dead state is the state of *balance* (noun) that has no movement, which is the opposite of the action of *balance* (verb), which is a dynamic and interactive process of energy and movement. This raises another point: if the dead state of high-entropy chaos, which has no order, is the most sustainable, then order itself can only be a temporary state. This appears to be true, as well as the implication that order can only exist in a state of imbalance. So, when we talk about sustainability, we're referring to the sustainability of order, which can only be in the temporary context of *balancing*, not the context of the *balanced* end state.

All the movement of energy at every level of reality results from energy traveling the path of least resistance as it seeks balance. We see examples of this everywhere, such as when we mix acids and alkalines like vinegar and baking soda or the more dramatic (and dangerous) example of hydrochloric acid and sodium hydroxide. After an extremely violent readjustment phase that releases a lot of energy (heat), it settles down to the very stable, lower energy-demanding products of water and table salt. Why does this reaction happen in the first place? Because the final combined state of water and salt requires less energy to sustain than the separate solutions, specifically, 57 kilojoules for about 4 teaspoons of salt water, which is the amount of energy a person would use to run 500 miles! The energy that is released is the amount of energy the new solution no longer needs to sustain itself.

The Universe, starting with the extremely violent Big Bang and ending (according to at least one popular theory) as a bunch of inert matter, the cosmic equivalent of water and table salt, is essentially the readjustment phase of different states of imbalance coming to terms with one another. Reality is the reaction of this adjustment, and like the chemical reaction just mentioned, it will ultimately balance out and just sit there, doing nothing.

When the great Zen master Shunryu Suzuki said, "*Life is like stepping onto a boat which is about to sail out to sea and sink*." he wasn't being darkly poetic. He was explaining how reality works. The ultimate destination of sustainability, on the cosmic scale, is death. In our current point in existence, sustainability means keeping the various parts of the "balancing machine" of nature working properly. In both cases, sustainability means balance, but with two very different results of short-term, or *temporal* balance and long-term, or *supernal* balance. For our purposes, the sustainability we are referring to is the temporal kind unless otherwise noted.

Key 39: Sustainability is a gauge of existence, and therefore life itself, at every level of reality.

Pions exist for about 26 nanoseconds, while the most massive black hole known, approximately 66 billion times larger than our Sun, would require $6x10^{99}$ years to evaporate. Does this mean black holes are more "valid" and more "true" than pions? No, because the pion's existence, short as it is, is inevitable; otherwise, the forces that caused it into existence would not have done so, but the validity of a pion, essentially the truth of its explicit existence, is only valid for 26 nanoseconds while the validity of a black hole is forever (as $6x10^{99}$ years may actually be longer than the life span of the Universe). By this logic, we can say that both pions and black holes are equally true and valid, but one's *truth* is sustainable for a bit longer.

Key 40: Something exists because its expression of energy patterns adheres to an order that must be maintained for that thing to continue existing.

Tree of Sustainability

Let's look at a more integrated example; that of a single cell, the building block of life. This is high-school biology, but let's go over it again.

Each of these processes has proven to be a more "valid" truth by being more sustainable than any alternative process.

Inside the cell are two meters of tightly wound strands of 4 very specific molecules held together by sugar phosphates, which make up that cell's DNA. These are $C_5H_5N_5$ (adenine), $C_5H_5N_5O$ (guanine), $C_4H_5N_3O$ (cytosine) and $C_5H_6N_2O_2$ (thymine). They are arranged in a very specific order which describes the instructions necessary to build every protein in an organism.

- In a process known as transcription, a molecular machine first unwinds a section of the DNA helix to expose the genetic instructions needed to assemble a specific protein molecule.
- Another machine then copies these instructions to form a molecule known as messenger RNA.
- When transcription is complete, the RNA strand carries the genetic information through the nuclear pore complex, the gatekeeper for traffic in and out

of the cell nucleus.

- The messenger RNA strand is directed to a two-part molecular factory called a ribosome.
- After attaching itself securely, the process of translation begins.
- Inside the ribosome, a molecular assembly line builds a specifically sequenced chain of amino acids.
- These amino acids are transported from other parts of the cell.
- They are linked into chains, often hundreds of units long. Their sequential arrangement determines the type of protein manufactured.
- When the chain is finished, it is moved from the ribosome to a barrel-shaped machine.
- It is then folded into the precise shape critical to its function.
- After the train is folded into a protein, it is then released and shepherded by another molecular machine to the exact location where it is needed.

These processes, and their order, are so specific, so complex, and so difficult to explain with current evolutionary models that Dean Kenyon, a Professor Emeritus of Biology at San Francisco State University who taught Evolutionary Theory, switched teams in 1979 and went on to be a key member in the "Intelligent Design" movement.

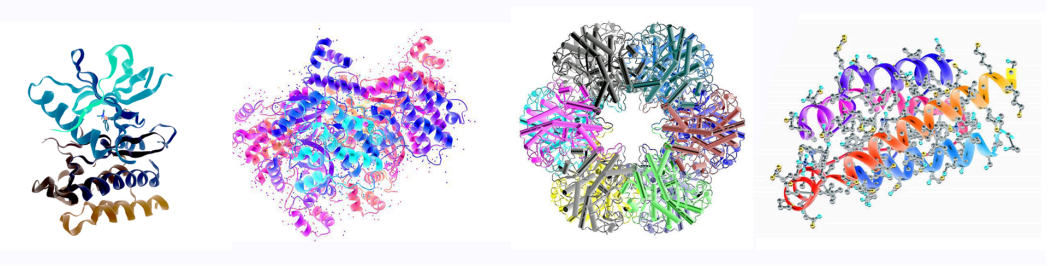
The important point here is that if any one thing in the list of processes listed above changes, if one atom in the $C_5H_5N_5$ molecule was different, or the "gatekeeper" made a bad call or a thousand other possibilities, the cell would either die, mutate, or otherwise become unsustainable, making the larger organism unsustainable. This is what cancer is, the malformed reproduction of cells that reduces an organism's sustainability. Interestingly, the cancer cell itself can be quite sustainable as an independent cell and only becomes a problem as a community of cells.

For a cell to be sustainable and to continue existing, only one process, made up of numerous detailed steps that must function properly, will result in successful functioning and reproduction. More importantly, we can't explain why any one particular option in any step, out of the countless theoretical options available at each step, is the one step that the process "knows" to select.

To put this in an even clearer perspective, using only 150 amino acids, there are 10^{77} possible combinations, of which only 1 yields a stable protein fold. Considering that there are 10^{40} organisms that have ever existed on Earth, the chances that a random mutation would emerge is $1{:}10^{-36}$.

In the world of biology, this exponential growth of possibilities is called *combinatorial inflation*. Remember that term, as we'll come back to it later on. Granted, It's not quite as bad as the likelihood of a million monkeys banging on a million typewriters to eventually produce the entire works of Shakespeare, but considering it would take 2,737,850 million-billion-billion-billion monkey-years to produce the line from Hamlet "RUMOUR. Open your ears"[64], how likely is the chance that this $1{:}10^{77}$ process could happen successfully 10^{40} times? For life to evolve (in the Darwinian sense) as it has over the past 4.5 billion years, this $1{:}10^{77}$ process would need to happen $7x10^{99}$

times per second, which equates to every living thing on the planet today performing this process $7x10^{74}$ times per second! If the vast majority of the 34 trillion cells that make up your body didn't all hit the jackpot of creating the *same* viable life millions, if not billions of times a second, life would have never evolved past the bio-goo stage. Admittedly, these numbers may be inaccurate due to their speculative nature, but the general idea that evolution as a genetic crapshoot sounds unreasonable as it is statistically impossible, especially when you consider that your body, which is just 1 of 4 billion species that have existed, has 10,000 different types of proteins (see image of 4 proteins below), each of which can range in length from 50 to 2000 amino acids! [65]



Evolutionists stick to their guns and say that all the other options, at one time in our past, were tried, and failed, leaving only the process that worked. Intelligent Designers will say that this was "biochemical predeterminism", i.e., the process was somehow pre-programmed. Both of these answers are just kicking the can down the road, that "can" being the question of where and how this historical record of what worked and what didn't work is stored along with the knowledge of a rigorous set of rules and conditions that informs the process, as well as how this data is accessed.

Let's look at a couple of macro examples on the social human scale and examine the serious questions it raises about how we understand it.

Yagé

This ritual psychoactive drink from the Amazon is also known as *ayahuasca*, *uni*, *nixi pãe*, *caapi*, *camarampi*, and many other names as well. One of the more fascinating details about yagé is how it is made and how it was discovered in the first place. The main active ingredient of yagé is N, N-Dimethyltryptamine (DMT). DMT is a powerful hallucinogenic drug that exists in plants (and the human brain) yet does not affect humans when taken orally because of the enzyme *monoamine oxidase* (MAO) in our blood that prevents it from passing the blood/brain barrier, which is a semipermeable membrane that separates the blood from the cerebrospinal fluid and which blocks many cells, particles, and large molecules, from entering the brain. This is a very good thing, as there is a lot of stuff floating around in our blood that can really mess with the brain.

In order for the DMT to get to the brain, it has to pass through the blood/brain barrier, and for that to happen, there must be something that stops the MAOs from doing their job. That thing is called an *MAO Inhibitor* (MAOI). MAOIs are commonly used in pharmaceuticals to help with ailments such as depression and Parkinson's disease (which, according to Stanford University, are the same two things that tango dancing also helps).

Modern science has known about both of these drugs for a little over 100 years. Indigenous Amazonian shamans have known about them for about 5,000 years. Somehow, in a manner beyond the ability of modern Western man to comprehend, these shamans managed to discover that the bark of one particular vine, from over 40,000 species of plants, contained a lot of DMT. They also, somehow, knew that an MAOI was needed, which they found in another of those 40,000 species. On top of all this, they had to know to stop eating meat, fish, milk, fruit, bread, and anything fermented for some days before taking the MAOI lest they suffer serious injury and/or death. Traditional anthropologists would have you believe they discovered this by trial and error, but with just a little thought, it is clear how ridiculous that theory is.

Of the 1,600,000,000 possible pairing combinations of Amazonian plants, only one produces the basis of yagé (it's actually far more complicated to make yagé than just mixing these two plants), and even then, only when a particular part of the plant is used. In addition, these 1,600,000,000 possibilities do not consider the variables of proportion or the specifics of preparation. For that many trial-and-error tests, even if every man, woman, and child in all of modern-day South America partook in the finding, preparing, and experimenting, it would take over 2,000 years, which then raises the question of record-keeping as to what was already tested. The fact that modern science could even consider such a theory is embarrassing.

Curare

The chances are astronomically greater for other substances, such as the paralyzing poison *curare* used by South American indigenous people for hunting.

Curare is a poison that paralyzes an animal, but soon after being paralyzed, the toxin is metabolized by the animal, rendering it harmless. That is essential, as you can't be eating the same poison you used to catch the animal. Just imagining that the locals knew of this requirement and then set out to find such a drug somewhere in the Amazon is difficult for modern anthropologists to accept.

Beyond that, there are 172 different types of this one-in-40,000 species in the jungle, and only one of them works, but the real kicker is that the fumes one is exposed to while preparing the curare are fatal! How does modern science imagine this was achieved?

> *Wanadi: "Trumak! Mojie just died testing that new batch of curare!" Trumak: "Bummer. And he was so close! Go and try that again with the same batch… and remember to keep smelling it. That's how you know it's done." Wanadi: "OK!"*

On the other hand, if one were to ask a shaman how these things were discovered, he would say, "The plants told us". Different cultures who have similar stories might say their ancestors told them, or the crickets, or the bones of a sacred animal, or the cracks in the shell of a tortoise after it has been heated and then dropped into cold water and then compared to the position of the stars, as was the case with the origins of the Chinese *I-Ching.*

Ancient Mysteries

There's another example that has more significant implications than simply refuting the idea that life is the result of trillions of simultaneous fortunate coincidences. This is shared because it appears to be another example where the theory of an *uber* intelligence gives more answers than the current mainstream scientific theory that boils down to essentially "Just lucky, I guess?", but unfortunately, my limited knowledge of the subject permits me only to raise the question.

Consider the human's 23 pairs of chromosomes versus the 24 pairs of our primate ancestors. How can higher primates have one extra pair of chromosomes than their more "evolved" descendants? Because 4.5 million years ago, the 2nd and 3rd chromosomes of some primate fused together in such a way to create one chromosome pair that did the job of two.

I say "evolved" in quotes because it may seem intuitive to think that the more chromosomes a species has, the more "evolved" they are, but were that the case, the Hermit Crab, with 254 chromosome pairs, would be the pinnacle of evolution on this planet.

We are not concerned with the significance of 23 vs. 24 chromosome pairs but with the unlikeliness of fusion resulting from a random mutation.

So, our 2nd chromosome does the same thing as our ancestor's 2nd and 3rd chromosomes.

Mainstream science refers to this chromosomal abnormality as a *Robertsonian translocation*. This *translocation* happens in about 1 out of every 1000 babies and is usually associated with genetic disorders and syndromes. This type of genetic mutation differs from a mutation in the DNA itself or even in the genes that the DNA forms. This mutation exists in the highest structure of genetics, the chromosome, which is why chromosomal mutations are usually fatal. Those that are not fatal tend to manifest as Down syndrome, leukemia, and other less-than-ideal side effects. As genetic mutations go, a chromosomal mutation that results in an evolutionary leap is as likely as surviving a fall from 30,000 feet and landing on the winning lottery ticket in downtown Shangri-La.

Still, *Robertsonian translocation* does a terrible job explaining the minus-one chromosome that resulted in humans. Typically, a *Robertsonian translocation* is when a part of one chromosome breaks off and gets attached to some part of another chromosome, but our 2nd chromosome is not simply a broken part of one chromosome attached to another; instead, it is a perfectly functioning set of merged chromosomes.

To suggest that this fusion was a *Robertsonian translocation*, we'd first have to accept that there was one primate that had this genetic abnormality who was lucky enough to mate with another primate that had this exact same abnormality (because 23-pair and 24-pair primates cannot reproduce), and that these two primates, and only these two primates, were responsible for the entire human race, that is unless we also accept that somewhere else on the planet there was another pair of primates with the exact

same mutation that mated. Of course, for this mutation to continue, the children of these two identically mutated proto-humans would have to only reproduce with their siblings… forever.

But let's suspend reason for a moment and pretend that it happened and that humans are, in fact, the results of 4.5 million years of mutated inbreeding.

Telomeres are a section of DNA that cap the ends of our chromosomes, similar to tying a knot at the end of a string to keep it from fraying. Centromeres are DNA segments located between the telomeres, usually near the middle of a chromosome (hence, the name), and they are critical to successful cell division.

Telomeres are at the tips of a chromosome, and centromeres are in the center. In the case of the human's fused 2nd chromosome, there are 4 telomeres, one at each end, and 2 in the center, which we'd expect if we fused to complete chromosomes together. Imagine taking 2 pencils, both sharpened at both ends, and putting them end to end; you'd have 2 tips, one at each and 2 tips connected in the center. There are also 2 centromeres, one at each center of each pencil. So now we have a chromosome with the *stopping* telomeres in the center and 2 *growing* centromeres. This should spell DNA disaster, but it doesn't! Why? Because, by the miracle of impossible luck, 1 of the 2 centromeres and both central inner telomeres happens to be deactivated.

There is a lively debate between geneticists regarding the origins of the human 2nd chromosome and why/how it proved to be an evolutionary advantage, and therefore why it was able to spread among the gene pool. Outside of the mainstream arguments, there is also the hypothesis that our 2nd chromosome was intentionally engineered by a visiting race that also had 23 chromosomes, and by making a 23-pair ape, these visitors were able to add some of their own genetic traits to the new hybrid they just created.

The question we ask here is not what is "true" or not, but which model provides a better understanding, i.e., which theory has better test results and predictions, regardless of whether it was aliens, natural radiation, or the ingestion of genetically altering edibles.

This same reasoning, I believe, applies to so many of the ancient mysteries that are inexplicable within our current understanding, and not only cosmic mysteries but technical ones as well[66]. The fantastic details and specificity of the Babylonian creation story (the *Enuma Elish*), the Vedic scriptures, the Epic of Gilgamesh, and other compelling evidence from cultures around the world that speak of other intelligences at play, suggest that mankind had access to an intelligence (and/or an intelligence had access to man) beyond what we currently believe was possible.

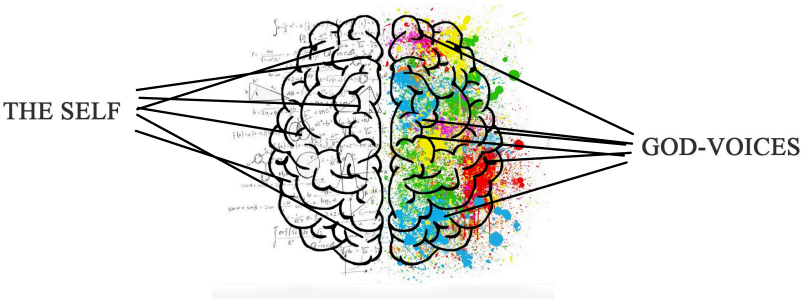
For Western man, talking to plants, insects, bones, or aliens in this manner is usually followed by a psychiatrist's prescription. Almost every other indigenous culture, including the indigenous culture that Western civilization grew from, had some way to tap into this organic knowledge database. Perhaps more importantly, they accepted that such a thing was not only possible but necessary.

Just as a cellular transcriptor has the intelligence necessary to manage its sustainability, which is then managed by the intelligence of a cell. This continues up the chain all the way to a human being (which is just a stop along the journey, as we humans are part of a yet larger system), it is not unreasonable to presume there is an *uber*-intelligence that manages its components of humans.

Our ancestors called this intelligence "the voice of the gods", and about 5,000 years ago, we started to create the idea of an all-in-one-version of the gods. This was an efficient idea and worked well given our ancestor's worldview's context and scope. It gave one name to all things unknown and satisfied their need for a sense of truth and order. Once named, it was left to humans to try and describe that truth and order.

The Human Brain and Reason

The American Psychologist Julian Jaynes proposed a revolutionary thesis in his book titled *"The Origin of Consciousness in the Breakdown of the Bicameral Mind"* (1976) wherein he explains that during a recent stage in the evolution of not only our ancestor's brain but the entire nervous system, we, as humans, had the ability to hear voices in our heads instructing us on what we needed to do and needed to know. These voices of unknown origin were attributed to the "gods", and therefore became the voice of Truth.



> *"Who then were these gods that pushed men about like robots and sang epics through their lips? They were voices whose speech and directions could be as distinctly heard by the Iliadic heroes as voices are heard by certain epileptic and schizophrenic patients, or just as Joan of Arc heard her voices. The gods were organizations of the central nervous system and can be regarded as personae in the sense of poignant consistencies through time, amalgams of parental or admonitory images. The god is a part of the man, and quite consistent with this conception is the fact that the gods never step outside of natural laws."* 67

Jaynes claims that a bit before 1000 B.C. (just around the time of the Tower of Babel by Sumerian accounts), the human consciousness was not yet "meta-conscious", meaning humans were not aware of their awareness. The bicameral part of Jaynes's theory suggests that there were two parts of the brain, the one that managed mundane jobs, habits, rote tasks, etc. (the self), and another part which, when faced with confusing and/or difficult challenges, took over (the voice of god).

> *[For bicameral humans], volition came as a voice that was in the nature of a neurological command, in which the command and the action were not separated, in which to hear was to obey.*

Sidenote: What we call the "ego" today evolved out of that really boring and mundane "self" part of the brain, so it's probably best not to use it for anything other than mundane tasks.

According to Jaynes, the transition from bicameralism to consciousness (linguistic meta-cognition) occurred from 1800 B.C. to 800 B.C. We know this time as the time when Hammurabi ruled Babylon and when he wrote down one of the first sets of laws known to humanity dealing with challenging and confusing issues such as contracts, wages, liability, inheritance, divorce, paternity, and reproductive behavior, to name a few, to the founding of Rome. This metamorphosis of consciousness ushered in the golden age of empires and cultures that laid the foundation of Western Civilization in areas of art, literature, theater, government, philosophy, mathematics, and even sports. (*I am singling out Western culture simply because that is the culture I best understand and which has the most information available, and not because I think other cultures have not developed along their own lines under similar conditions.)*

From the days of Rome and the ancient Greek philosophers to today, our bicameralism has further diminished, which can account for the decreasing incidents of people hearing the gods speak to them. This may have been a "good" thing. Still, the problem that arose as a result of the gods abandoning us, forcing us to apply reason to challenging problems when our pleas for guidance were ignored, is that our newly developed tools of reason were prone to reject any ideas that we could not understand, which were many, given we were still new at the whole reasoning thing during some very desperate times. Our fledgling ability to consciously make sense of things seemed to be working, so it naturally dominated our worldview, even if we were, and are, still figuring out how it works. This was the birth of *human* intelligence (as opposed to universal intelligence). Lao Tzu refers to this time in our history as:

> *When men lost their understanding of the Tao, intelligence came along, bringing hypocrisy with it.*

Still, as Jaynes so eloquently puts it:

> *The mind is still haunted with its old unconscious ways; it broods on lost authorities; and the yearning, the deep and hollowing yearning for divine volition and service is with us still.*

Hence, religion.

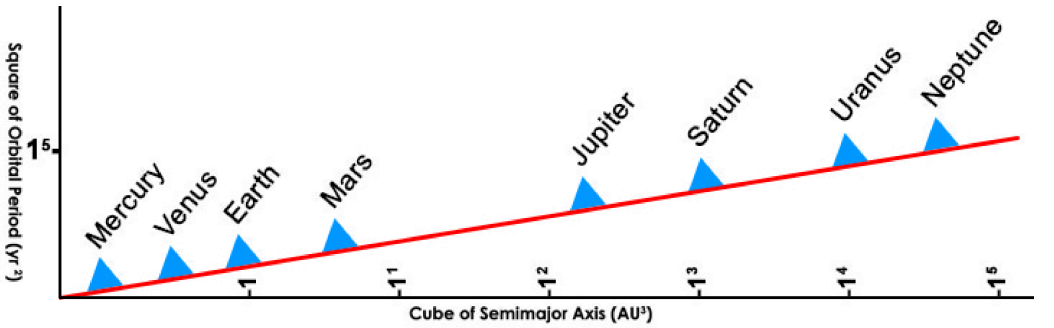
Anything and everything that did not fit into the highly constrained and "reasonable" worldview was pushed farther and farther outside the box of mainstream thought until we arrived at where we are today. In one way, this "inquisition-by-reason", which served to purge heretical thoughts from the dogma of the cult of reason, was, and is, reasonably necessary and useful because, in the reformation that has begun, those ancient ideas that can withstand the tests of our deeper understanding of reason will be resurrected in a new form with a broader and more integrated understanding.

The memories of the cell, the voices in our ancestor's heads, the wisdom of the plants as heard by the shamans, and countless other instances of "divine" or "mystical" knowledge all beg the same questions: Where does this information come from? Where is it stored? How does one access it?

Perhaps *reason* has evolved to the point where we may be able to answer these questions reasonably.

The Path of Reason

The rules and conditions of reality we have discovered have followed a perfectly reasonable path long before man could claim them as such. Sometimes it takes a while to find them, but eventually, we do so far.



For thousands of years, Man looked at the path of the stars and came up with various stories about why they were where they were. It wasn't until Kepler discovered the pattern by plotting the paths on a logarithmic chart that the reasoning became clear. This became Kepler's *3rd law of planetary motion* which states *"the square of the planet's orbital period is proportional to the cube of its distance from the Sun".* In the same manner, we discovered DNA is a helix because of hydrogen bonds, etc., so we can say "Here is a pattern and the rules that created it".

This is not to say everything that the gatekeepers of the Church of Reason consider "unreasonable", such as myths, magic, aliens, hyper-dimensional beings, and numerous other paranormal, metaphysical concepts, are, indeed, "unreasonable". On the contrary, it's pretty unreasonable to presume they have no reasoning behind them, as many of these ideas perfectly conform to natural law, albeit within a scope that extends outside our modern boundaries. Today we see planets as law-abiding balls in space and DNA as spiraling compounds, but our ancestors saw gods that showed them the way and spiraling serpents of powerful magic. Who is to say which is more "true"?

Historical examples of once unreasonable ideas include electricity, flight, wireless communications, space travel, nuclear energy, and pretty much the majority of the reality of modern life. These things were considered nothing less than magic and

science fiction until we could discover and recognize the rules of how they worked. Once we found Bernoulli's law[68] works in harmony with the law of gravity, we mastered the magic art of flying.

Key 41: Reason is based on the codification of the rules of reality as we have come to know it.

The benevolence of self-preservation

If our reasoning is based on the world we observe, then this implies that everything in nature, everything in the Universe, must, therefore, be "reasonable", at least according to the laws of existence, but sometimes the reasoning we have derived from our limited observations is inaccurate or lacking.

Key 42: The rules of reason are predetermined based on the rules of our reality that we have recognized, and these rules require that any "reason" that exists must abide by them.

Take, for example, our reasoning behind the evolutionary drive for self-preservation. We assume it is a somewhat selfish, yet necessary, biological drive passed down through our genes to increase the gene's chances of reproducing themselves. This makes sense if we see the world only as a bunch of individual entities competing for resources.

Another way to see self-preservation is from the perspective of the larger organism which is composed of many contributing organisms.

Take the example of a collective, such as a tribe. If the collective is destroyed, all its members suffer from that loss. The collective, then, has a strong responsibility to the members. On the other hand, if the members were to become damaged somehow, the collective would also suffer. So, the collective will both attempt to preserve itself for the sake of its members and preserve the members for the sake of itself. We don't think of a collective as an organism, but all organisms are collectives; therefore, collectives *can* be organisms. Now apply this reasoning to an animal. The animal will attempt to preserve itself for the sake of its "members" (organs, limbs, cells, etc.), and preserve its members for the sake of itself. In the case of a tree, a tree will attempt to protect itself for the sake of its members, which it needs to maintain sustainability. For example, besides bark and thorns, a tree will emit chemicals that attract the enemies of the invading species, which is pretty amazing when you wonder how it "knows" how to do that. A leaf will attempt to protect itself with fine hairs, spines or thorns, bitter and even toxic substances. We tend to think of a tree as a thing that has a trunk, branches, and leaves, but it can also be understood as a collective organism made up of other collective organisms, such as trunk, branch, and leaf, each taking care of itself and its immediate children.

From the perspective of the parent organism, such as the collective, it is worth losing a member if that means it will benefit the collective and/or the ability of the collective to preserve its members.

One example is the cardiac muscle cells that have the self-preservation ability to duck, dart, and dodge foreign substances. Still, these actions may harm the cells to the point where they can cause a fatal heart attack, all in an attempt to preserve themselves, even though they are killing their parent organism.

Some theorize that they do this because there is a greater chance of the heart surviving if the cells can avoid damage and hold out for the possibility of the heart being resuscitated. This may be so, but I wonder just how many successful resuscitations have occurred over the past 520 million years (which is how long ago the heart evolved), at least prior to the invention of CPR in the 18th century, otherwise how or why would the heart cell "think" resuscitation was even a possibility? A far more reasonable explanation is that the component elements of a person (the cells, in this case) are compelled to preserve *their* component elements (nucleus, chromatins, cytoplasm, organelles, etc.). Killing the parent organism is not its concern, nor within the scope of its influence, as the preservation of the members is the concern of the parent organism, which has obviously failed to protect its components in this case. The sacrificed parent organism of *person*, which exists within the collective (tribe, community, country, etc.), will only lose one (improperly functioning) member. With a bit of thought, one might question whether modern medicine is doing a disservice to the larger organism we humans serve, whatever that is. I suppose history will be the judge.

In this particular example of cardiac cells, their self-preservation can be fatal to the collective (of the *person*), but in most cases losing a few cells is not fatal to a person. By the same token, the *uber* organism that humans are a part of (family, society, government, etc.) only forfeits one human. This is happening in our bodies 60 billion times a day, as that is how many of our own cells die and are created every day.

Key 43: The most efficient model for a collective is individual self-preservation.

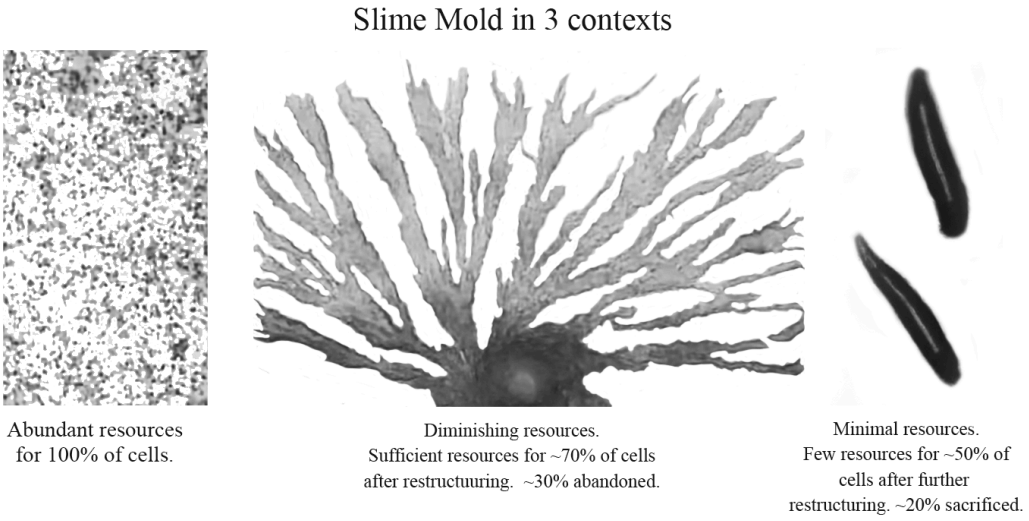
Seeing self-preservation more as a protecting-the-family-of-component-parts makes much more sense *if* we also see that every organism in the hierarchy of life, from cells to cities, is an individual entity.

Just as an entity will endanger its parent collective to preserve its members, a (healthy) collective will sacrifice a member for the betterment of the whole.

This perspective also explains how a person can sacrifice themselves for the sake of another, even though they have no genetic connection to the other person, ruling out genetic preference as is the case when a parent sacrifices themselves for their child. This would also suggest that our most basic drive is not only the survival of the self but also the survival of something more important than the self, yet still be self-serving. We see this in cases of honor, country, god, etc., and other examples common in a collective.

You might think this is a trait unique to humans, but this is not the case. We see instances of this in single-cell organisms [69], multi-cellular organisms [70]such as slime mold, where, when faced with scant resources, specific cells will sacrifice themselves for the sake of the greater organism. [71], virulent parasites [72], plants [73], to name a few.

In society, this is clearly exemplified in soldiers willing to die for their country or ideology, as well as countries willing to send their soldiers into war. In times of scarcity, we can see parallels as well.



How is going to war an act of self-preservation? It is the self-preservation of the entity of *tribe*, and the self-preservation of the soldier that makes him valuable to the tribe; otherwise, he would be a useless soldier. The soldier is willing to fight for his tribe because his interests and preservation depend on the tribe, just as a leaf depends on the branch. Another factor that is obvious in humans and some animals, and may even exist in all life forms, is *love*. Humans regularly sacrifice themselves for love of family, country, god, etc. This would strongly suggest that love trumps genetic survival as the prime candidate for evolution, a factor that should be considered when looking at evolution (but currently is not). I am not bold enough to speculate as to what the true nature of love is other than to say it is the cause of at least one significant effect: commitment. This commitment is of primary importance to the sustainability of the child organisms as well as the parent organisms of family, tribe, and, by extension, god. This raises an interesting philosophical question; does god need such commitment to be sustained, just as a tribe or a family needs commitment from its members to be sustainable? It is reasonable to presume that the sustainability of something depends on some commitment from that of which it is composed.

This self-sacrificing quality turns out to be fairly common across life in general. Quoting the paper published in *the International Academy of Ecology and Environmental Sciences*, "Invasive cancer as an empirical example of evolutionary suicide" [74] :

> *In recent years, a large portion of the literature has focused on evolutionary suicide. "Darwinian extinction" or evolutionary suicide is one of the most important findings in adaptive dynamics [which inevitably bring us to the conclusion] that evolutionary theory falls short of adequately explaining the phenomenon*

> *of life in its fullness and complexity. This is due to the fact that [evolutionary suicide] is not a rare or special case and that it can occur in the most common ecological conditions.*

We also see a less dramatic version of this in genomes, which will reduce their replication rate instead of committing suicide to help other genomes.[75]

As unromantic as it sounds, "evolutionary suicide" is a commitment, an act of love, to the greater organism (not exactly Hallmark material). Still, this perspective is reasonable and does a better job of explaining how and why life operates the way it does.

With ideas such as wave functions and the many-worlds theory of quantum physics, the morphic field of biology, the research into hyper-time telepathic communication (for long-distance space travel), self-determining AI, etc., it's easy to see how what we accept as "reasonable" will dramatically change as we learn how these new processes of reality and life work.

Some may see this as an example of "Intelligent Design". We prefer the term "Coherent Integration" to represent an integrated self-similar pattern of moving energy that extends far above and below that sliver of the reality spectrum we are attuned to perceive.

This idea is similar to the theory that was put forth 250 years ago by the man who not only laid the foundation of modern economics but did so specifically with the idea of eliminating poverty and increasing sustainability. Adam Smith referred to this power of self-preservation in his *Theory of the Invisible Hand*, described in his book *An Inquiry into the Nature and Causes of the Wealth of Nations* published in 1776.

> *The natural effort of every individual to better his own conditions, when suffered to exert itself with freedom and security, is so powerful a principle, that it is alone, and without assistance, not only capable of carrying on the society to wealth and prosperity, but of surmounting a hundred impertinent obstructions with which the folly of human laws too often encumber its operations.*
>
> *It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest.* ***~Adam Smith, 1776***

Applying this idea to society also suggests that the most sustainable practice for the world at large can be summed up in a phrase that is attributed to international banks, John Lennon and Yoko Ono, Buckminster Fuller, and more[76] :

> *Think globally, act locally*

This is easily practiced by spending your money at local businesses rather than Walmart or Amazon, or simply, to quote Mother Theresa when asked, "What can we do to promote world peace?", "Go home and love your family."

Key 44: There is an order to creative processes, and creations are a product of order.

Given all that, it would be hard to ignore the insane elephant in the room rampaging out of control. Governments are global tribes, and in a healthy system, the government supports its members, and the members support their government. In general, this has been the case, and by "in general", I mean to say that there is a slight edge in favor of healthy governments over unhealthy governments. We know this because we can see the progress made in concepts of justice and human rights from the Code of Hammurabi, to the Magna Carta, to the Enlightenment, which gave us the U.S. Constitution.

> *Ideas of justice and human rights possess a long and rich history. They did not originate exclusively in any single geographical region of the world, any single country, any single century, any single manner, or even any single political form of government or legal system. They emerged instead in many ways from many places, societies, religious and secular traditions, cultures, and different means of expression, over thousands of years. Indeed, they took millennia to evolve, since they always depended upon their specific historical context and what was possible in the face of established tradition and often determined resistance, at the time.* ***~Dr. Paul Gordon Lauren, historian, "The Foundations of Justice and Human Rights in Early Legal Texts and Thought"***

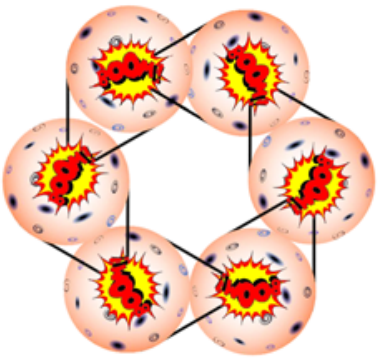
That "slight edge" leaves a lot of space for unhealthy governments, as any historian can attest. The modern world of global access has given rise to a new type of tribe, the multinational corporation (MC), that does not answer to those that support it, nor does it have the support of its members. The MC is more parasitic than synergistic, but parasitism has proven to be a very successful strategy. These MCs can wield power more than most governments, and even among the largest governments, they have tremendous influence. Relative to governments, they are efficient, fast, smart, and expanding a global network at malignant rates. This is not the place to go into how governments and MCs have formed a sort of global corporatism that seems to be heading toward a kind of digital neofascism. In any case, this appears to be a very unsustainable system, much in the same way industrial agriculture is unsustainable, as both systems destroy the interests and degenerate the abilities of its members (people and plants, respectively). Both systems will ultimately fail or transform into something else, but as we have seen in history, it may take a long time to fail or change.

Cycles & Waves

Let's return to the concept of oscillations. *Cycles* are similar to *oscillations*. The difference, at least in the context of this book, is that *oscillations* describe more of the quantitative properties such as frequency, wavelength, etc., while *cycles* refer more to the qualitative values, such as the medium and its effects, value, seasons, life, animal migrations, etc.

One of the most fundamental concepts we have in our attempts to understand reality and the Universe is that of *cycles*, which is one of the earliest concepts humans explored for obvious reasons.

> *Everything that has been studied has been found to have cycles present... We do not need to know what this force or cause is - it is enough to know that it must be something. We then proceed from there to find it.* ***~Edward. R. Dewey, Founder of "Foundation for the Study of Cycles" in 1941***[77] ***and chief economic analyst for the Department of Commerce during the Great Depression****.*



The Big Cycle is, of course, the cycle of the Universe. There are a lot of different theories about how the Universe came into being, the most popular being that it began with a Big Bang, but we're not sure how it will end. The candidates for the Big Finale are the Big Crunch, the Big Freeze, and the Big Rip. Of these 3, only the Big Crunch is cyclic, causing a new Big Bang. There's no recovering from the Big Freeze and Big Rip scenarios. These are one-cycle-only options. The more sustainable option is the Big Crunch, as it delivers unending Big Bangs that occur *inside* black holes, creating new universes with black holes that create Big Bangs - Systems within systems, just like the reality we live in. "But what if it's wrong?" is then the question. It's silly to think that in 1,000, 10,000, or 100,000 years, we won't have an entirely different view of how/why reality began and/or will end, so whatever we come up with now (or at any time), is more about reality as we *perceive* it, not as it *really* is. Still, we have some pretty awesome ideas about creation and reality, such as the *Holographic Theory* and the *Simulation Hypothesis*. Of course, it may be the case that this reality is "only" a simulation, but that does not take away from its cyclic nature, for if it is a simulation, whatever it is simulating is obviously cyclic in nature.

Holographic theory/simulation hypothesis

This section is on cycles, specifically cycles of creation. However, the holographic/simulation hypothesis may not be a cycle, although whatever it is holographically projecting/simulating is. At the risk of wandering off-topic a little bit, this is the best place to briefly review this topic as it is relevant to the larger picture.

The essence of this idea has been around for a long time, probably starting with the first ape who accidentally ate the wrong mushrooms and thought, "this is all an illusion!". Its more traditional lineage goes back to the "Skeptical hypotheses" of ancient Greece and the "The Butterfly Dream" of 3rd century B.C. Chinese philosopher Zhuang Zhou. These ideas found more form in the "Cartesian doubt" of René Descartes, finally culminating in Oxford philosopher Nick Bostrom's "Simulation hypothesis" theory and book *"Are you living in a computer simulation?"* in 2003 (also a documentary[78]).

There are two ideas; the holographic theory, which can be tested [79], and the simulation hypothesis, which is like the holographic theory for philosophers, and although there are bits of evidence, it seems we are faced with the same problem Zhuang Zhou had: If we can dream we are a butterfly, how do we know where are not dreaming we are human? Or, how can we test if we are in a simulation when the only things we can use for testing are also simulated? Philosophers have their work cut out for them. Still, as a hologram *is* a simulation, and reality as we know it is already holographic, simulation or not, I've taken the liberty to combine them.

How is this reality holographic?

- **Hologram**: creates images by channeling light through patterns formed by dividing 1 light source into 2 parts; light and the light that is a reflection of matter.

- **Universe**: creates things by channeling energy through patterns formed by dividing 1 energy source into 2 parts; energy and matter.

In this scenario, where reality is a simulated projection, the Big Bang would be the equivalent of a cosmic hacker flipping the "on" switch to their "Reality Framework Server". These projections come from black holes with their *event horizon* (the point from which nothing escapes) acting as a diffraction grid (in higher dimensions) for the energy it is projecting to form a "reality", just like a hologram.

We think of this world as analog, but it may well be digital, albeit with a level of resolution far beyond our ability to perceive (which would make sense if one were designing a simulation). This diffraction grid can be imagined to be made up of a series of 1s and 0s, each "bit" occupying a square Planck length (1.616×10^{-35} m^2). To put this in perspective, the number of "bits" on the surface of *V616 Monocerotis*, our nearest black hole "projector" a mere 3,000 light-years away, is around $2.3313x10^{88}$. There are only 10^{82} atoms in the Universe (we think), so that is a big number, and from just from 1 of the 100 million black hole projectors in our galaxy alone, and we already know of 500 billion galaxies just within our range of observation, so we know of at least 5×10^{19} "higher-dimension reality projecting CPUs" (for lack of a better term) that are all working in perfect synchronization, theoretically.

Even more mind-bending is the possibility that the reality being projected is only "rendered" on-demand, i.e., this reality simulation creates wave functions of possibilities that only "collapse" into form when they are observed. Apparently, creating actual physical reality is a "CPU" intensive task, or perhaps this reality was developed by creators that could only get their hands on a low-end simulator.

Using the word "simulation" is also misleading, for that implies it is an artificial rendition of something that already exists. It's more like a *bona fide* creation, albeit one that may have been designed around a specific model or for a particular (yet unknown) purpose.

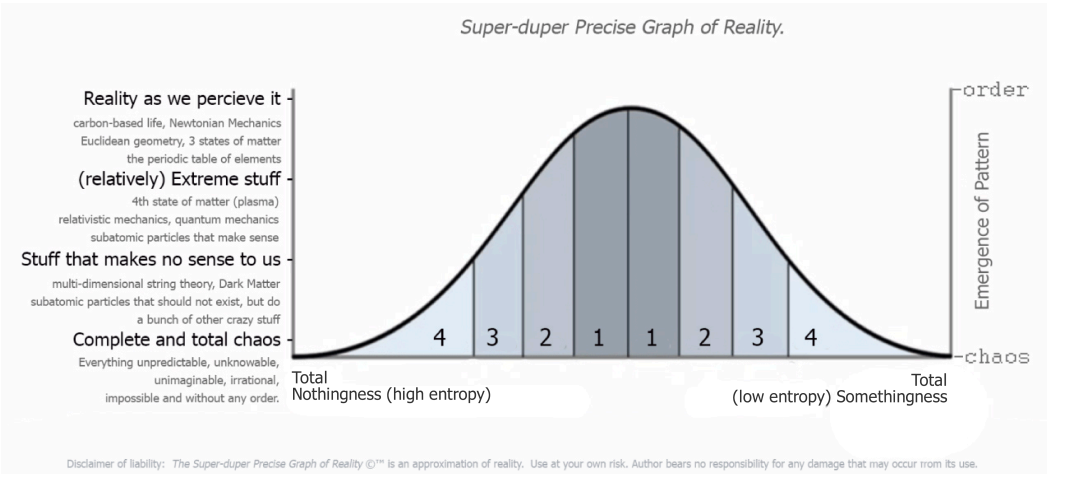
One thing (most) creation theories have in common is how surprisingly compatible they are with the creation myths of the Judeo-Christian, Islam, Hindu, Zoroastrian, Taoist, Buddhist, and even Aboriginal Australian, the world's oldest civilization[80], where cycles of creations are implicit in all of them, and explicit in many of them. We would expect to see this similarity between radically different perspectives, such as modern science and ancient religion if they were all attempting to understand the same thing.

What Goes Where?

Key 45: All dualities stem from the first duality.

Suppose the 2 primal, conceptual, and opposing end-points of the spectrum of our reality are *somethingness* and *nothingness*; that leaves a lot of space for pretty much anything to exist. Entropy tells us that the probability of where stuff will appear will be naturally distributed along the spectrum in what is called a *Bell curve*, or normal distribution of probability curve. Regardless of the number of variables at play, the probabilities of where stuff will appear will always tend toward this *normal* distribution.

If we had the ultimate Bell curve between the states of nothingness (high entropy chaos) and somethingness (low entropy chaos), the part of the curve that represents the most sustainable condition of these two states would be in the middle because the middle is the point where there is the least amount of disorder and therefore the highest probability for order as each side will be represented in the most balanced and sustainable manner. The chart below is a general concept of the idea.

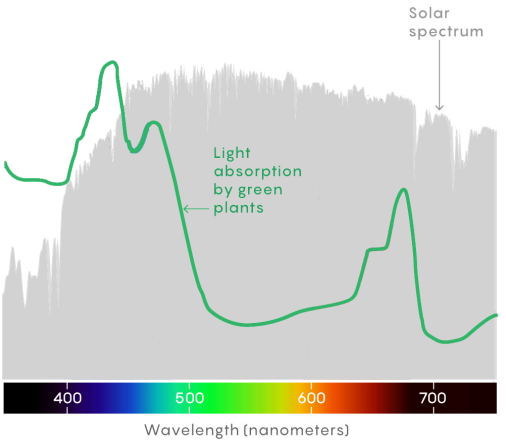


We see this sort of distribution everywhere in nature. In the world of theoretical biology, this is called *environmental dimensionality* and describes how various biological systems coexist[81] in whatever scope and context apply.

Key 46: The most likely and persistent state of anything (including ideas) that exists due to other states will be where the most balance exists between those other states.

Key 47: Order emerges most efficiently in a balanced state.

For example, the human eye sensitivity chart below shows that a particular shade of green (555nm) is the most dominant color because this is the middle of the range of our biological sensitivity to light. This shows that the most efficient (most energetically ordered) function of our eyes is the perception of the color green. The general prevailing view of why primates, and many other animals, are so sensitive to green is because they evolved in a very green world. The tholonic view is that while that might be a contributing factor, the larger reason is that the visible spectrum is exactly in the middle of the electromagnetic spectrum (assuming frequencies in the 10^{30} Hz range is the upper limit), with 10^{15} Hz (ultraviolet) being dead center, and also happens to be the highest energy light reaching Earth's surface. The entire visible spectrum plus the near ultraviolet spectrum takes up 0.0035% of the middle of the EM spectrum. This makes visible light the most "efficient", ordered, expression of EM energy and is why this is the only range of EM radiation that can be used for photosynthesis, most of which occurs in the visible spectrum (between 400 nm and 700 nm). Dead center to this range is the frequency 5.45×10^{14} Hz, or wavelength 550nm, or pure green. Plants evolved to absorb the most efficient form of energy that hydrocarbons could interact with, and why virtually all vision of all animals and insects center around the color green (300-700nm range), regardless whether they can detect only 1 range of color (dolphins) or 5 ranges of color (birds), regardless of what color the environment they evolved in was.



But wait... if plants should be absorbing green, why do they reflect green? Surprisingly, the answer to this question was only properly addressed in 2020 [82]. In short, the researchers discovered that plants have opted for stability over efficiency, preferring to make a "portfolio" of energy sources from the less energy efficient colors with reduced input from the green range. This increases the stability of energy, eliminates big fluctuations in energy and reduces "network noise" during the photosynthesis process. Because the green light is the most energetic, it can cause rapid and dramatic changes in the chlorophyll network which then has to work harder to compensate for the irregularity. The red and blue light they do absorb is also processed at different rates, allowing for a more flexible and stable supply of electrons to the cells, which is critical as too few and the cell fails, and too many can cause cell damage.

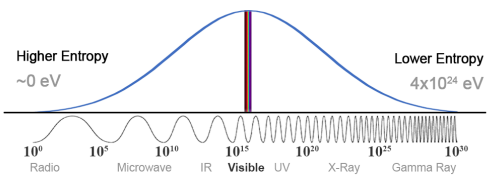
It's kind of like the opposite of how certain countries which are abandoning the stability of fossil fuels to move to "green" energy have discovered that when there is no wind and/or sun, there is no energy, which not only stresses their energy

infrastructure, but attempts to compensate their energy supply ends up creating a larger carbon foot print than if they hadn't gone "green" to begin with. If only people were as clever as plants.

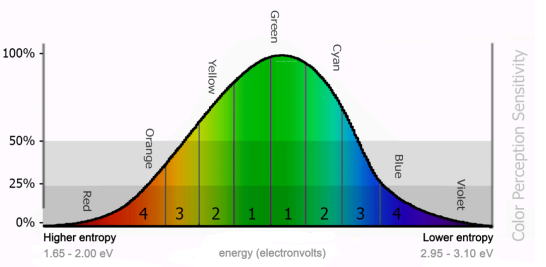
You might think that the blue light, which has more energy than green light, would have the same effect, but the green light can penetrate much deeper into the plant that the blue light, making green light the far more efficient transmitter of energy. The cells in our eyes, which send signals to the brain, do not have the same demands as the chloroplasts in plants, which convert light into chemical energy, so there is no need for such advanced stabilizing processes.

Color sensitivity is not to be confused with confused with eye "machinery", such as the eagle's built-in telephoto lenses due to a deep fovea, however, the mantis shrimp has the ability ability to auto-adjust its eye's sensitivity to different wavelengths.

Efficiency is contextual. An excellent example of contextual evolution was found in the Movile Caves in Romania. These caves were sealed off 5,000,000 years ago, yet within the hostile environment, rich in hydrogen sulfide gas and sulfuric acid, at least 33 new species of life have evolved and flourished, feeding off the bacteria that eat rocks and other inorganic material (*chemosynthetic bacteria*).



Efficiency of radiation emission



Efficiency of radiation perception

Note: in the chart above, the maximum frequency listed, 10^{30} cycles per second (cps), comes from the fastest gamma ray ever recorded and was detected on Sept 16, 2008. It came from a mega-super-nova some 12 billion light years away, which is to say this mega-super-nova happened 12 billion years ago when the Universe was about 1.5 billion years old. The gamma rays were moving at 99.9999% of the speed of light, suggesting that 10^{30} cps is getting close to the upper limit of the maximum end of the spectrum.

The oscillations between 2 states, be they the 2 states of chaos, order and disorder, movement and stillness, or any 2 points that are different yet can form an interaction, is the most basic form of energetic expression in all the orders of creation. On this point, metaphysics, spirituality, and science all happily converge: everything exists in a duality of some sort, or at least that is how we can describe everything.

Were this duality to no longer exist in a state of imbalance or difference, the cycles of creation, nature, the movements of the Universe, would also cease. Nature is the balancing in these imbalances between systems across all scopes, all the way down (or up) to the first act of imbalance/balancing.

Waves

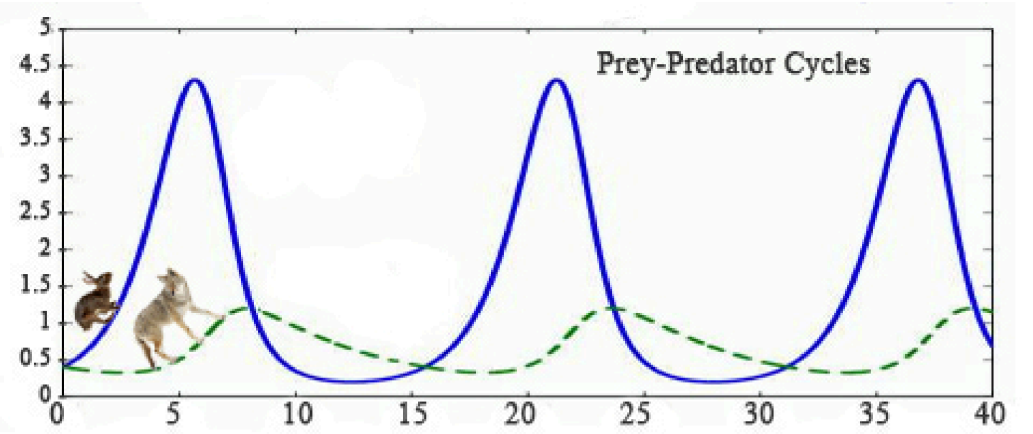
Waves are an expression of cycles. When we look at simple waves, such as light, radio, and sound waves, we see an oscillating movement of energy over time.

On the atomic level, there are electromagnetic waves, such as light, X-rays, radio waves, etc. On the material level, we have mechanical waves, such as sound waves. On the organic level and beyond (planets, life, culture, politics, etc.[^44]), we don't use the term *waves*. Instead, we call them *cycles*, representing the same thing as waves but in a different context and scope.

Concepts of *frequency* and *wavelength* are typically terms we use to describe these waves of radiation and vibration. Let's look at a typical wave model, which is one cycle of a quantity of energy moving over a period of time. We say that the time it takes to complete one cycle is the frequency, and the distance it covers in one cycle is the wavelength. We *could* say the moon has a wavelength of about 50 million km, with a frequency of 0.00599584916 Hz, or that the migration cycle of the Arctic Tern, a bird that flies back and forth between the Arctic and the Antarctic every year, has a frequency of 1/yr., with a wavelength of 70,000 km (which is how far they travel every year). We don't because it's cumbersome, non-intuitive, and contextually confusing.

As meaningless as these terms are for such cases, it does not take away from the idea that these natural cycles are the expressions of the same law that light waves operate under in the transference of energy, but on a different level of expression, on a higher order of complexity, size and dependency where instead of photons we have birds and planets.

Another example might be the interdependent cycles of cohabiting rabbits and coyotes. It might sound ridiculous to compare X-rays with prey-predator cycles, but both share the most basic function, the transference of energy in an attempt to create balance, just in two very different scopes and contexts.



Not Just a Cycle

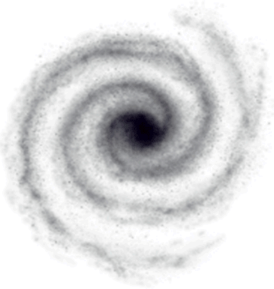
There may be more to waves than just a simple periodic cycle, at least in how it interacts with their environment. For example, when we take a wavelength that is the circumference of the world and map it across the equator, we find an inordinate number of cultural artifacts representing incredible advances for the time, stretching over 7,000 years. More than that, there has been a lot of speculation and research[83] into why the Great Pyramid and Macchupicchu, or the Nazca Lines and Easter Island, fall within this same line (in the image below) to within less than one-tenth of 1 degree of latitude. Some other locations, such as Persepolis, Mohenjo Daro, Petra, Ur, and the temples at Angkor Wat, fall within 1 degree. It's almost as if the inhabitants of Earth unconsciously knew something that had some relationship with a wavelength the size of the planet they lived on. Could it be the case that Earth's inhabitants are moved by this wavelength of Earth similar to how sand is moved on a vibrating surface to form patterns?

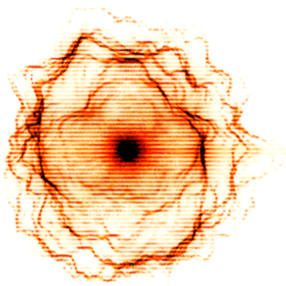
The two most common classes of waves are electromagnetic (subatomic particles) and mechanical (particles, M-waves). If we were to compare them, we would see similarities that we could also identify in cycles, such as those mentioned here, but that is beyond the scope of this book as it would be a book itself. We can at least compare the properties of the 2 common classes of waves.

Mechanical Waves	Electromagnetic Waves
Travels fastest in the densest matter *(diamond)*	**Travel fastest in the least dense matter** *(vacuum)*
Caused by the amplitude of energy	**Caused by the amplitude of energy**
Has a theoretical speed limit of the speed of light, *c* *(but the fastest recorded speed of an M-wave was measured in a diamond, traveling at 18,350 m/s, about 1/16557 the speed of c.)*	**Has a theoretical speed limit of the speed of light, c**
Has longitudinal waves *(the medium vibrates parallel to the wave direction)*	**Has longitudinal waves** *(but they fall off and become negligible after just a few wavelengths)*
Has perpendicular waves *(transverse waves, where the medium vibrates perpendicular to the wave direction)*	**Has a perpendicular magnetic field**

Yes, for all physicists and electrical/mechanical engineers that might be reading this with extreme incredulity, there are many differences between electromagnetic (EM) and mechanical (M) waves. We would expect energy to express its movement quite differently when operating under the laws of subatomic particles than that of matter. Still, there will be many analogous parallels between the two.

To put their contexts and scopes in perspective, consider that an electron is 100 million times smaller than an atom, and 20 trillion times smaller than a chromosome, let alone the sizes we are talking about for typical M-wave medium, like things you can hold in your hand. Compare that to the Milky Way galaxy, which is 167,256,410 times the size of our solar system, and Earth is only 1/38000 the size of that. The difference between an electron and a beach ball is about the same difference between a beach ball and the entire galaxy. With that in mind, consider that the ratio of the actual Universe compared to the observable Universe is equivalent to an atom compared to the observable universe. It's easy to imagine how a fundamental law might be expressed differently at these different scales.





The similarities are more important than the differences, such as how energy travels through a medium via waves. All forms of energy are simply a redirection of energy from one state to another, as energy is neither created nor destroyed. This is the 1st law of thermodynamics, the conservation of energy. We have identified many forms

of energy: sound, chemical, radiant, electrical, atomic, mechanical, elastic, ionization, gravitational, and dark-energy (that's the energy causing the Universe to expand faster than we think it should), so is it unreasonable to imagine still more forms of energy? Are emotions like love or fear, desires, thoughts, or even imagination a redirection of energy? And what form does that energy take? Can we say that we know of every type of medium and cycle and the laws that control them? I don't think so, but we can begin exploring by applying the fundamental laws of energy and cycles.

We can only recognize energy as one form or another, not as pure energy itself. An everyday example of this is that you can't see or detect light until the light energy hits something, like a detector, a dust particle, or the optical cell in your eye. The same is true for electricity, and all other forms of energy. The real mind-bender here is that the dust particle, and all mass, is also energy, but in a different form, as we have been shown with $m=E/c^2$. This means we can only see energy when that energy interacts with another form of itself. Energy alone is like a black hole… we can't see it, but we can see its effects on its environment. Because of these effects, we can say that energy creates sustainable patterns, interacts with other forms of energy, and must oscillate in some medium. #### **Key 48:** We can only see the interactions of energy and not the energy itself.

What about the energy that does not oscillate? Is there such a thing as a 0 Hz frequency energy? Yes. It's called *direct current* (DC) electricity, and it is the most common in nature; lightning, static electricity, bio-luminescence, solar particles, etc., but the electrons that transfer that energy *do* have frequencies, as both waves and particles. Plus, the energy being transferred and the electrons that are transferring it are certainly traveling in a cycle, for if they were not being returned to the source and recycled, not only would the current end, the circuit would run out of electrons. While AC is caused by electrons staying in one place and jiggling back and forth 60 times a second (in the U.S.), passing a charge down the wire close to the speed-of-light, the force of DC is always in the same direction, like a river. While it is passing the current along at the speed-of-light, the electrons are also being dragged down the wire at about 3 miles per hour, which is the speed at which they return to the source. That cycle is slow, big, and fundamental pattern in how nature functions. *Alternating current* (AC) is quite rare in nature, although AC does technically exist as the planet's magnetic fields flip. e.g., the Earth's magnetic field has reversed 171 times in the last 71 million years, and the Sun's magnetic field flips every 11 years. The AC form of electricity was only recently invented by the Frenchman *Hippolyte Pixii* in 1832 and popularized by Nicola Tesla, creating a new scope and context of energy design by and for humans.

Pure energy, theoretically, would either have to have a frequency of &infin with a wavelength of 0 or a wavelength of ∞ and a frequency of 0. Energy with a wavelength of 0 is energy that never moved in space-time, so we won't be seeing much of that. However, DC energy is virtually energy whose cycle has a wavelength of ∞ and a frequency of 0 Hz, but within a system that still moves in a cycle, making DC energy not only nature's #1 choice of energy distribution but as close to pure energy as can exist. Of course, in actual reality, there is no such thing as an absolute 0 Hz, just frequencies that are really, really close to 0 Hz

We do not have words for many things as we have yet recognized them and therefore can't describe them, measure them, or even identify them. It is not just reasonable to speculate that in the realm of ideas and archetypes, there are also cycles and a medium that are entirely new to us; it's pretty unreasonable not to, as they, too, are an expression of energy.

The real question regarding energy is, "What *is* energy?" Surely the answer to this question would shed light on the very purpose and meaning of existence, as everything that *is* is energy. Fortunately, the culmination of thousands of years of research and investigation into the greatest mystery of all time has provided an answer, and here it is:

> *Energy is the ability to perform work*

Were you expecting something a bit more… profound? Well, stand in line. This definition is like defining a cat as "*the ability to reduce mouse population*". Both definitions say what the subject *can* do but says nothing about what it *is*. There are many kinds of energy, such as kinetic, potential, thermodynamic, metabolic, etc. We know how to measure it, how it acts, and that it can't be created or destroyed. Energy is like the proverbial duck; we know how it looks, quacks, and walks, but we have no idea what a "duck" is. With this definition, the answer to "What is phlimquitz?" is "the ability to increase suicides by increasing the federal space technology budget".

As far as science is concerned, energy is simply a value that equates to movement, which is fine for the physical sciences, but not for understanding the mechanics of awareness, which is the point of this book (and which we'll get to very soon).

We can expand on this by pointing out that ordered systems "work" more efficiently than chaotic systems. Chaotic systems do not synchronize with any other system[84], so, like the Las Vegas of energy, any "work" performed in a chaotic system stays in that system (for the most part). Ordered systems synchronize well, so "work" is more easily distributed between systems, allowing for a much wider energy distribution. This irony that chaos is facilitated by order was mentioned previously but is worth repeating:

> *Low entropy chaos creates order to better distribute energy, resulting in high entropy chaos.*

Key 49: A high state of order distributes more "work".

Work

Refining the concept of "work" may seem like an odd segue at this point, but now that it has been brought up, let's be clear about what this means.

In a physical sense, “work” is anything that can be measured in joules (or calories) because “work” is defined as “using force to move something,”… period. That something might be atoms, molecules, muscles, bricks, neurons, or anything that *can* move, regardless of why such things are being moved. From a physics perspective, building the Taj Mahal and creating the world’s largest garbage landfill is the same regarding the work involved if they both burned the same number of calories. The amount of work, in calories, expended in the full-time effort for an entire year on solving the quantum theory of gravity is equal to 2 cups of tuna salad or the equivalent of jogging less than 2 blocks a day[85].

The issue is that “work” is measured only in quantitative values, which cares nothing about the qualitative values of that work. This is fine when optimizing a steam engine but not when applied to the real world, where quality is just as important as quantity, if not more so. Where humans are concerned, quality requires intention. One must *intend* to create something beautiful, like the Taj Mahal, as it won’t happen by accident.

Let’s see if we can translate our energy concepts into the realms of effort and intentions. For example, we all understand the concept of *resistance* in our daily lives, which is anything that makes whatever we are attempting to do more difficult (usually measured in time, money, or aggravation). *Volts*, or potential, is also easy to equate, as we are (hopefully) aware that we can probably lift 100 lbs. but not 500 lbs., as doing so will most definitely “short circuit” your back. The same goes for *current*, which is more like stamina. You can’t lift a 500 lb. stone, but you can probably lift a 5 lb. stone 100 times. It’s not that far a stretch to relate physical work with electrical work, as in both cases, the work can be measured in joules, but in the realm of human will, and conscious intentions, these definitions get a bit more abstract as we have no idea how to measure such things.

An example of this might be the effort it takes to quit smoking. “Effort”, in this context, captures the concept of work as well as intention, but in a totally different context. It takes a lot of effort to quit smoking, but 0 calories and 0 additional energy, as we usually define that word. With this definition, the technical meaning of entropy is useless, as no scientific instrument can measure intention or will, but the concept is still valid. Entropy in this context of effort is “the amount of effort not available for use”, or simply “lack of effort”.

How can we measure something subjective, especially something already so abstract, like entropy? If you ask me which I would prefer to do, dig a trench for 6 hours or listen to a 1-hour lecture on *Post-modern Fashion in Appalachia*, I’d be digging before you could say “in Berkeley”. I’d rather expend an additional 10,000,000 joules (2390 calories) shoveling dirt than sitting in a lecture hall feeling tortured. Here, the “path of least resistance” is far more thermodynamically inefficient, but that’s just for me. Someone else would be tickled pink to attend such a lecture (I assume). However, if energy must always travel the path of least resistance, then one can only presume that the non-thermodynamic energy I am conserving by not having to listen to that lecture is greater than the thermodynamic energy I am losing shoveling dirt. Whatever that energy is, science can’t measure, and what science can’t measure, science ignores. One way it *could* be quasi-measured is to ask what the limit of shoveling is before I choose the lecture. If I draw the line at 6.5 hours of shoveling, then I must feel the lecture will “cost” no more than the psychological equivalent of 10,000,000

joules, whatever that is (psycho-joules? Calories of aggravation?), but even then, that value could change at any moment, for any, or no reason, depending on my state of mind of how much wine I drank at dinner.

Pressure, difference, order, movement, and pattern, are low entropy states or states that require effort to maintain. We can now add the more qualitative concepts of moderation, control, command, discipline, and determination to this category. Dispersion, disorder, and stillness are all high entropy states or states that require little effort, as do the qualitative states of indecision, apathy, doubt, flexibility, irresolution, and weakness. Microstates, or the number of possible configurations of how energy can move between two (or more) states, remain the same in concept but as it applies to effort and in the context of that effort. How many ways can the "system" of *you* expend effort towards when you have the intention to address a specific issue? For example, how many ways can you quit smoking, learn piano, lose weight, kill mosquitoes, write a poem, etc?

Take one example, such as losing weight, of which there are at least 29 ways to accomplish[86]. Some people will choose one way, and others will choose other ways. This is similar to how the quanta use different paths to distribute themselves among bonds. In North America, the most popular way to lose weight, and the way chosen by 60% of dieters (according to Nielsen Global Health & Wellness Survey), is to change their diet away from fatty and processed foods and more towards natural, fresh foods. We might then surmise that this microstate is the one that represents the balanced exchange of, or application of, effort. Obviously, a major difference is that humans, and all living things, can select many microstates at once, unlike quanta, which can only select one. Still, the probability curve will remain the same if we consider a living thing as having many "quanta" of effort.

In molecules, the exchange of energy is induced by the natural tendency for energy to balance itself between 2 different states of energy, such as hot and cold. Here, the 2 differing states are "what is" and "what is intended", regardless of whether that intention resulted from necessity or desire. The intention acts to balance that difference, as in, "I am overweight. I need to lose weight. I will diet". But, as we all know too well, intention without effort is useless (and possibly dangerous). Energy causes something to change direction or move; here, it is effort that causes *something* to change direction or move. Whatever is being changed acts as resistance, so we'll just call it that.

Notice what we have now. *Resistance* is acting like *mass* that requires *effort* over *time*, or *force*, to change, and the amount of that *force* is determined by one's *intention*, or what we would refer to as *force of will*, which is another way to say *intention*. Metaphorically, the concept of $F=m\times a$ is perfectly captured in this one sentence from a speech given to the graduates of the Lenox Academy in Massachusetts, which coined the phrase "onward and upward":

> *Fail not for sorrow, falter not for sin, but onward, upward, till the goal ye win.*
> ***~Frances Anne Kemble, 1809-93***

This phrase makes it quite clear that *intention* to reach one's goal must be a consistent *force* greater than the *resistance* of sorrow and sin.

Can we then say, if $F=m\times a$, then *effort*×*time* = *resistance*×*intention*?

Let's test this. We'll use the values of ***f***=force, ***e***=effort, ***t***=time, ***r***=resistance, and ***i***=intention.

Imagine these scenarios where different people must quit smoking:

- A life-long smoker has a strong habit (r=10) with a mild intention (i=2) to smoke. $f=i\times r \therefore 2\times10=20$
- A beginning smoker has a mild habit (r=2) with a strong intention (i=10) to smoke. $f=i\times r \therefore 10\times2=20$

In either case, the *force* of smoking is 20. To bring the force to 0 either, *intention* (to smoke) and/or *resistance* (to not smoking, habit) must be reduced .

The strength of the *resistance* is a result of how long, or much *time*, the *effort* to smoke was applied when measured by *intention* because $r = \frac{e\times t}{i}$ or $r = \frac{f}{i}$. For example:

- A lot of effort applied to smoking (e=10, i.e., 30 cigarettes per day) over a long time (t=100) with weak intentions (i=2) to quit, resulting in a resistance of 500. $\left(r = \frac{10\times100}{2} \therefore\ r = \frac{1000}{2} = 500\right)$
- Mild effort applied to smoking (e=2, i.e., 6 cigarettes per day) over a long time (t=100) with weak intentions (i=2) to quit, resulting in a resistance of 100. $\left(r = \frac{2\times100}{2} \therefore\ r = \frac{200}{2} = 100\right)$
- A lot of effort applied to smoking (e=10) over a short time (t=10) with weak intentions (i=2) to quit, resulting in a resistance of 50. $\left(r = \frac{10\times10}{2} \therefore\ r = \frac{100}{2} = 50\right)$
- Mild effort applied to smoking (e=2) over a short time (t=10) with weak intentions (i=2) to quit, resulting in a resistance of 10. $\left(r = \frac{2\times10}{2} \therefore\ r = \frac{20}{2} = 10\right)$

You can see that the long-time heavy smoker has the greatest resistance to overcome while the beginning mild smoker's resistance to quitting is small, but the long-term mild smoker has twice the resistance as the short-term heavy smoker.

The strength of the *intention* is a result of how long, or much *time*, the *effort* to smoke was applied when measured by *resistance*because $i = \frac{e\times t}{r}$ or $i = \frac{f}{r}$. For example:

- A heavy smoker (e=10) who's been smoking for a long time (t=100) but doesn't think it's that big a problem (r=2) has an intention to smoke of 500 $\left(i = \frac{10\times100}{2} \therefore\ i = \frac{1000}{2} = 500\right)$.

- A heavy smoker (e=10) who's been smoking for a long time (t=100) but thinks it's a problem (r=10) has an intention to smoke of 100.
  $\left(i = \frac{10 \times 100}{10} \therefore \ i = \frac{1000}{10} = 100\right)$.
- A heavy smoker (e=10) who's been smoking for a long time (t=100) but thinks it's a huge problem (r=100) has an intention to smoke of 10.
  $\left(i = \frac{10 \times 100}{100} \therefore \ i = \frac{1000}{100} = 1\right)$.

Was this test "successful"? It correctly predicts who would have the hardest time quitting, the effects of effort over time, and even tells us that smoking a little for a long time creates a bigger problem than smoking a lot over a little time, which we know to be true[87]. While we can't apply the statistical data of physics to these concepts of effort, force, resistance, and intention, there certainly seems to be a correlation between the laws of physics and these broader interpretations of the physical attributes. This is what we would expect to see if we were looking at how fundamental patterns of energy apply to different contexts.

If this correlation has any merit, then we can also say that intention equates to voltage, effort equates to amperage or current, and resistance is resistance. This correlation is poetically poignant when you consider how high-voltage/low-current circuits are more dangerous than low-voltage/high-current circuits. You won't feel anything if you touch the terminals of 12 volt 5-amp battery, but touch a 220-volt supply with 0.27 amps, and you will be shocked, literally and figuratively, even though they both have the same amount of power, implying that that big intentions with little effort are more dangerous than small intentions with a lot of effort. Is this true? Is attempting to start a new business, get married, or climb Mount Everest with little effort more dangerous than 100% commitment to balancing your checkbook (not that anyone has a checkbook these days), waxing the floor, or buying a new pair of slippers? For anyone who has experience with these examples, the answer is obvious.

Simple Cycles

Let's look at the simple cycle again as the archetypal pattern that describes the movement of energy through a medium, regardless of the medium. In some contexts, this pattern is quite measurable; in others, it is analogous, such as in the migration pattern of the Arctic Tern.

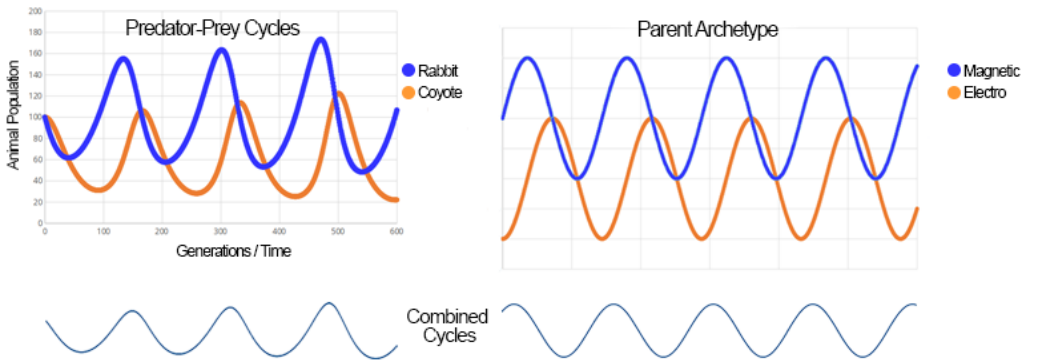
When we examine the predator-prey cycles, we see they follow the same cyclical archetype of light, electricity, or sound. Below we show a typical predator pray cycle (taken from a Northern Arizona University online biology class). On the left is the data over time, and on the right is the "Phase plan", or the graph of the relationship between the 2 variables (coyotes and rabbits). This is a naturally occurring cycle, but you'll notice that the two cycles naturally occur $\frac{1}{4}$ a wavelength apart, which is the maximum difference any two waves can have. We also see this in electricity, where voltage lags current by $\frac{1}{4}$ wave, or how electric and magnetic fields in a wave are 90° apart. Quite literally, the predator is acting like the *voltage*, and the prey is acting

like *current*. In the world of electricity, *resistance*=$\frac{voltage}{current}$, R=$\frac{V}{I}$, and *power*=*voltage* × *amperage* (*P*=*V*×*I*). Does this mean we can find the equivalent to *resistance* in the predator/prey cycle with $\frac{predator}{prey}$?

If we look at the numbers, they don't appear to make a lot of sense as $\frac{1000\ \ coyotes}{10\ \ rabbits}$ =100, or $\frac{10\ \ coyotes}{1000\ \ rabbits}$=0.01, which says that the more resistance, the more the coyotes die of starvation, and the less resistance, the more the rabbits die by getting eaten. However, let's look at it energetically. If the rabbits are being eaten, there is a transfer of energy from rabbit to coyote, and the coyote continues to contribute to the chain "downstream", so to speak. If there are no rabbits, the coyotes die of starvation, and while the energy is still transferred back into the earth (from decomposed coyotes who died of starvation), the chain's downstream has been weakened. In this sense, the value of the *resistance* would represent the *resistance* to the chain's *sustainability*, as the rabbits are to coyotes, what coyotes are to wolves, and what wolves are to mountain lions. Ultimately, everything ends up back in the ground, feeding the grass the rabbits eat. In the coyote/rabbit world, a coyote needs about 275 rabbits a year to survive if all they ate was rabbits. This would then mean that the baseline *r-value* for a coyote/rabbit *system* is $r = \frac{1}{275}$=0.00363. Of course, coyotes don't just eat rabbits, so in practice, *r-values* for all the systems interacting with each other would need to be determined and integrated before these values had any practical meaning.

What about the *power* equivalent with *predator*×*prey*? Certainly, the concept of *power*, which is the rate at which energy is transferred, applies to coyotes eating rabbits, and *current*, which is the amount of energy moving through a system, would apply to the rabbits, at least as far as the coyotes are concerned. With a little imagination and creativity, you can see how this ecological cycle could be described as an oscillating circuit using concepts of Newton's 2nd law of motion.

In the image below, the left column shows the *Predator-Prey Cycles*, and beneath that, the cycle of the *system* of coyote/rabbit (combined cycles). The right column shows the *Parent Archetype* of the *Predator-Pray Cycles*, which is 2 perfect sine waves out of phase by 90° the same pattern we see in electromagnetic energy. There is another archetype not shown, and it is the archetype of the archetype, or the *Meta Archetype*. As it has no context, no values apply, so it's just a flat line, a frequency of 0 Hz, just like nature's DC current.



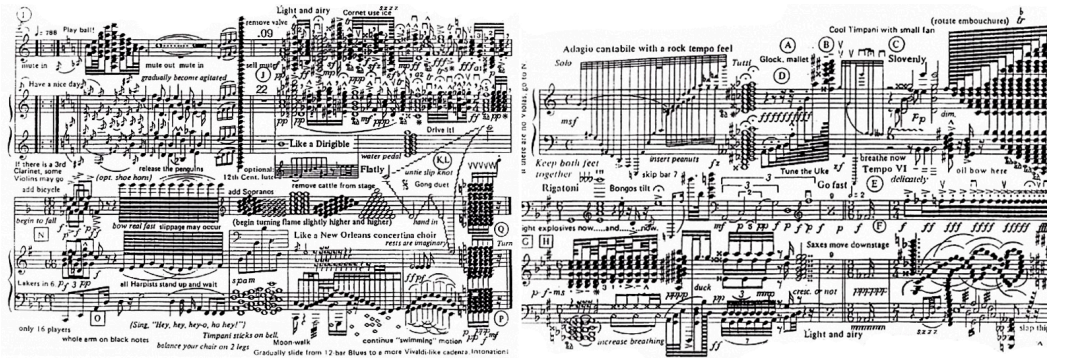
We keep bumping into the same universal constants and concepts in humanity’s quest to understand reality and its processes, either through religion, culture, economics, nature, alchemy, or science.

6: INFORMATION

Information follows the same rules as everything else in nature.

Synopsis: *Just as there an unfolding of reality via chaos ⟶ pattern ⟶ order ⟶ integration, there is an unfolding of data ⟶ information ⟶ knowledge ⟶ understanding or sound ⟶ notes ⟶ scales ⟶ music. Order, being self-similar, naturally forms hierarchies, and the most stable of these hierarchies will be found at the optimal balance of the duality it exists within. This not only applies to the emergence of awareness but to the biological structure through which awareness is expressed as individual consciousness, which inherits these same properties and processes.*

Keywords: *data, information, knowledge, understanding, noise, holarchies, memes*



(Image: Piano score of Faerie's Aire and Death Waltz, from "A Tribute to Zdenko G. Fibich".) [88]

The same patterns that we see in the world around us we can find in the data from the world around us, thus transforming data into information. How, then, do we define *data* and *information*?

Data

To answer that, we can deduce that there is no data in the void of nothingness. Data can only exist within a duality, which implies that there is energy, which means oscillation within finite boundaries in accordance with specific laws of existence. So, what is the difference between data and existence itself?

Key 50: Data is the static by-product of the movement of energy.

Data is static because all data is *stateless*, meaning data has no dependence on or relationship to anything in the past. The process that generates the data may have such dependencies or relationships, which would make it a *stateful* process, but the

data produced can only represent the *state* of a system and any given moment. But what about historical data? That data that is not in the present, but it is still data, correct?

We can say that data is from the past or predicts the future, but to do that we have to not only add a dimension of time to the data, but we that have to relate the time dimensions across many data and in an order of time. In other words, we have added *statefulness* to the *stateless* data.

Strictly speaking, it is the *datum* (singular for data) that is *stateless*, and the *data* (plural of datum) is a collection of *datum* over time or space, making it (potentially) stateful, depending how the data is used.

Flipping a coin is *stateless*, as there is a 50/50 chance it will be heads or tails regardless of the result of the last 100 flips, but the odds of flipping 101 heads in a row is about 4×10^{-31} because all the *states* of the 101 flips are seen as a larger *system*.

In its most basic form, data is numbers, words, units of measure, and other conceptual abstractions we invented to describe the phenomena within the spectrum of existence we can perceive and use.

Suppose we accept the premise that everything that exists does so within the laws of creation. In that case, we also need to accept that nothing exists that is not in perfect harmony with these laws because if they were not in perfect harmony with the laws, they would not exist. Therefore, everything that can exist does, and everything that cannot exist does not, which implicitly tells us that:

Key 51: All data is valid.

Depending on what theory of reality you prefer, “everything” can mean all of that which exists at this moment, or, if you subscribe to the *Block Theory* of the Universe, *Special Relativity*, or *Quantum Theory*, “everything” *must* mean everything that did, does, or will exist.

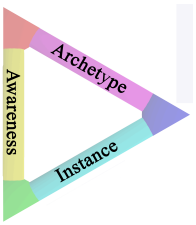
The tholonic view is much simpler; if data is a by-product of existence, then something only exists if it produces data, regardless of whether anyone or anything can detect that data. This is not strictly a tholonic concept, as this is essentially the definition of what science calls *Realism*. Science defines *Realism* as “*a positive epistemic attitude toward the content of our best theories and models, recommending belief in both observable and un-observable aspects of the world described by the sciences.*”, which is a typically abstruse science-ish way to say “evidence that supports a theory”, which boils down to “things have values”.

This view suggests that everything that ever did, does, or will exist currently exist somewhere in the grand scheme of reality, but in our corner of reality, the existence of that which *is* depends wholly on something’s ability to observe it. This is true not just on a practical level, as we can’t say something exists if we have no awareness

of that thing, but also on a technical level if there is any truth to the *Copenhagen interpretation of quantum mechanics* that the act of observation, of becoming aware of the data of an existence, is what causes the wave functions of quantum probability, i.e., archetypes, to "collapse" into material form. We say that awareness causes these quantum archetypes to instantiate as matter.

It may also be the case, at least according to Roger Penrose, the mathematical physicist considered to be "the most important physicist to work in relativity theory except for Einstein" [89], that archetypes collapsing into matter is what creates consciousness, which is an instance of Awareness. This implies that the first consciousness, the first instance of Awareness, came into existence when the first *thing* came into existence. What that first thing was, be it the singularity of all mass, the 0-dimensional dot, or something else, given that it came into creation simultaneously with the Universe, we can safely say that Awareness is a universal property.

If we think about it, a black hole may be the perfect instance of "nothingness" in the sense that no *thing* exists in a black hole, as any *thing* that enters a black hole is reduced to its fundamental particles, which get added to the soup of fundamental particles made of leptons and quarks and such. These are the most basic building blocks of all matter and are themselves not composed of smaller particles. As these particles act like waves and fields until they are observed by something or someone, and as there is nothing or no one to observe them in a black hole, everything must be just a bunch of un-collapsed wave functions, which are not particles. That sounds as close to nothingness as it gets.



Science doesn't know which came first, awareness or archetype, so it could be $archetype + awareness = instance$ or it could be $archetype \rightarrow instance = awareness$. In either case, we have some relationship between these properties because the archetypes contain the models of everything that can or will ever exist, and they produce data. Still, it is not until we find or become aware of that data that some *thing* can be said to exist. This is why we say that things that we can't see but appear to create data are "real" and exist, such as quarks, black holes, 11-dimensional strings, and even time itself, because data says they exist.

Where Here When Now

This deserves a little more of an explanation.

The tholonic view is that the difference between what *does* exists and what *can* exist is the difference between the *here and now* and the *not here and not now*. We understand the single phenomena of *space-time* as having the properties of *space* and *time* which we also know as the properties of *where* and *when*.

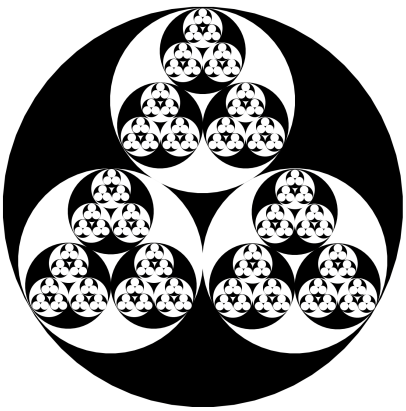
The state of something at any moment describes only that moment, not the past or the future, as data alone is *stateless*. How it came to produce the present data and the data it will produce in the future depends on the patterns of the data, which is *stateful*.

These terms are borrowed from the names of network protocols upon which the Internet is built.

Stateless systems are self-contained and functions independently with only presently available data. Stateless systems are high-speed, can be deployed quickly with the least amount of work, require minimum infrastructure, and are very robust and adaptable. They are not well suited for integrated, intelligent, or data-heavy operations. An example of stateless systems in nature would be inanimate objects such as subatomic particles, elements, molecules, rocks, planets, stars, and things that increase in entropy (become more disordered).

Stateful systems depend on previously recorded data and store their own data for future stateful operations. Stateful systems are more efficient for integrated, intelligent, or data-heavy operations and require more resources and memory. An example of stateful systems in nature is living things, or things that evolve, such as DNA, galaxies, and things that decrease in entropy (become more ordered).

Of course, all systems in existence are made of systems within systems, each system depending on other systems to exist, so, in reality, all systems are a combination of stateless and stateful systems with each system's statefullness or statelessness being relevant only to the context and scope of that system. For example, a rock can be considered stateless in the scope of macro objects, even though it depends on the molecules it is composed of (which depend on the atoms). DNA, while being stateful, is composed of stateless molecules, and so on.



We see this same thing in the Internet, as the protocol on which the Internet is built, the Transmission Control Protocol (TCP), is stateful, as it must keep track of the entire "life" of a transmission; when it begins, how much has been sent, when it ends, etc. However, the information being sent is stateless, as it is just a collection of data moving from point A to point B. On top of TCP is the protocol to send and receive web pages; called HTTP (Hyper Text Transfer Protocol), which is stateless, but web applications (e.g., Google Maps) add an extra layer of architecture that uses HTTP to integrate stateless systems into create stateful systems stateless → stateful → stateless → stateful → … This alternate layering of systems within systems is conceptually illustrated in the very fractal image above with stateless circles in black, and stateful circles in white.

How does this apply to the data and information on a space-time/existential level?

The present has no past or future. This makes the present a *stateless* condition of *space-time* that has no past and no future, and its only temporal attribute is *now*. Likewise, the only spacial attribute of *now* can be *here*. In this context, *here* refers to the *system* of *space-time*, a domain that includes the entire Universe in all its dimensions. You may be thinking, "If I am *here* and you are *there*, then there is obviously a *there* there", and that would be correct if *here* referred to the system, or subsystem, of an

observer whose domain is limited by their ability to perceive. From the perspective of the Universe or even the Multiverse, there can only be a single *here* for beyond *here* is nothingness. Within that single *here* that can be multiple *heres*, and within each of those *heres*, there are more *heres*, ad infinitum. This is somewhat similar to Relativity's claim that the perception of time is the same for everyone regardless of how their time appears to others. In the same way, everyone's *here* is the same regardless of where their *here* is and of other *heres*, or the *there-nows*, appear to them.

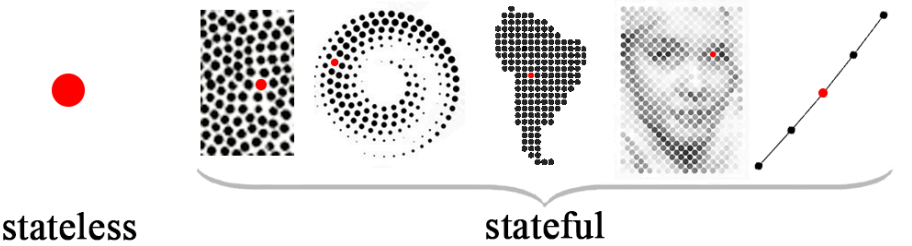
Our ability to grasp the concepts of *past* and *future* allows us to understand patterns and change, which allows us to plan and predict, but neither is "real", at least in how we classically understand these concepts. The *stateful* conditions of *where-when* are simply historical records of a once *here-now* of a past present. Of course, we'll have to expand our ideas of past and present if there is anything to those experiments that suggest the present can alter the past and the future can alter the present[90]. This shouldn't be a problem. If we can redefined "real" as:

> *Something is real when it is a necessary ingredient of a theory that correctly describes what we observe.* ***~Sabine Hossenfelder, theoretical physicist***

... then I am confident we can also redefined "cause", "effect" and "time" to make it all fit.

Ironically, this scientific definition leaves the door wide open for some very liberal definitions of "real" once we begin to question the meaning of "observe" and "theory".

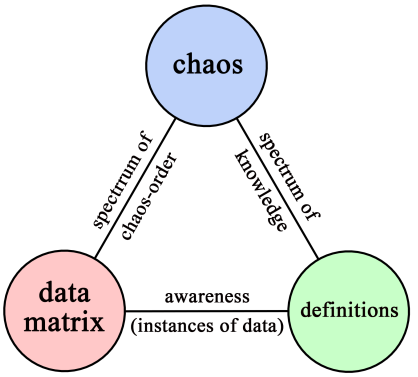
Many books, theories, and speculations exist on the true nature of time. We will take the simplest reductionist (and therefore most likely to be correct) approach and claim that *here* and *now* are not only *real*, but are the only aspects of *space-time* that are *real*.



What was just said about the temporal aspect of space-time also applies to the spatial aspect of space-time. A point of data is a 0-dimensional concept, but let's imagine it as a red dot for this thought experiment. In the image above, we see a single data and collections of data, but we clearly see patterns that are not dependent on past or future as we are seeing them now. In this case, the data points are still *stateless* even though they create patterns that result from the *relationships* between the data points. Hence, the relationship is *stateful*, but the data is still *stateless*.

In the temporal case, data is produced in the *present*, the *now*. In the spatial case, data is produced at a location, which would be the location where the data is from, but from the data's perspective, the location is always *here*. This sounds odd because we

don't think of data having a location, but it has a location in at least 2 domains. The first domain is that of instantiation, such as matter or energy. If we are measuring a desk, that desk has a location. If we are measuring heat, we are measuring it at some location, etc.



The other domain is where any piece of data exists in the spectrum of all data, which we'll call the *data-matrix*. For example, take any number, such as 7. 7 is a piece of data that comes after 6 and before 8; that is its location in the spectrum of data. Every piece of data that can exist is a distinct unit defined by limits and its relationship to other data. Data *has* to come from that perfectly structured set of values, the *data-matrix*; otherwise, it would be useless, and math wouldn't work. When we measure anything, we are mapping something that exists in some state of chaos to a perfectly ordered set of data that never changes. Suppose we measure something as 7, be it 7 degrees, 7 feet, or 7 days. In that case, we are saying that whatever we measure equates via some definition, such as temperature, distance, or time, to a particular location in the conceptual landscape of the *data-matrix*. The image above shows one way to view the relationship between the chaos of reality, the order of the data matrix, and the definitions we create that enable us to relate them.

There is the *stateful* relationship between *stateless* data at any point in time. This collection of data points we'll call a *data-frame*. In every moment, a new data-frame is created, and our perception of the *differences* in these data-frames accounts for reality as we know it. Reality is the difference between relationships in both space (relationships in a data-frame) and time (relationships between data-frames). We are going to accept the current claim a "moment" of time is 10^{-44} seconds, as this is *Planck time*, the time it takes a photon to travel the shortest length that can exist, which is *Planck's length* (1.62×10^{-35} meters).

All this was a fairly wide detour to simply say that what *does* exist exists in *here-how*, and what *can* exist exists in *here-when*. In terms of data, we know we can splice the genes of a human toe into mouse genetics to get a mouse with a human toe growing out of its back, but a back-toed mouse does not exist (hopefully) in *here-now* and therefore is not currently producing data. A back-toed-mouse *could* exist but currently does *not* exist. As there is no *state* of back-toed-mouse, and as data is *stateless* and requires a *state* to exist, no data exists.

Key 52: All data is valid, is only created in the present, and is stateless.

What, then, is information? The classic and simplest definition is "*data that we can use to understand something*", which is just another way of saying "*Information is data that has meaning*" but we need first to understand what "understand" means before

we can understand what “information” means. What we could say about information, which we mentioned earlier, is that information must be *stateful* because it consists of data of many *states*, giving it a “memory” of previous states and “knowledge” of their relationships. We can at least say that *information* is the relationship between *data*.

What about *understanding*? Again, the traditional meaning is *“the knowledge of why or how something happens or works”.* This is pretty unsatisfactory and quite arguably wrong. At the risk of sounding Clinton-esque, debating what the definition of “is” is, the words *“use”* and *“understand”* are entirely subjective and offer no actual meaning. With the word “work” defined as simply *“to function or operate according to design”*, this entire definition is vague, as best.

Can we come up with a better definition of the words *knowledge* and *understanding*?

To know something’s function and purpose is the fundamental goal of science, philosophy, and even religion, as these disciplines require a demonstrative understanding which we can see in their relative forms of reasoning.

Like in the dancing-woman-in-the-dots example, we can perceive something that is little more than subjective projection and has no basis in objective reality. This human ability to “recognize” things in meaningless images brought about the famous Rorschach inkblot test, as it provides some insight into how a person perceives the world by their perception of patterns they project onto the random images.

In the world of philosophy, this knowledge-as-projection is exemplified in the *cow in the field problem* first posed by American philosopher Edmund Gettier. It goes like this:

> *A farmer is concerned his prize cow has gotten lost. A neighbor comes to the farmer and tells him he saw the cow in his field. To double-check, the farmer visits the neighbor’s field and sees his cow’s familiar black-and-white shape. Satisfied, he goes home. The neighbor also decided to check. The cow is in the field but hidden behind some large bushes. However, a large sheet of black and white paper is caught in the bushes. It is clear that the farmer saw this and thought it was his cow. The question is then: even though the cow was in the field, was the farmer correct when he said he knew it was there?*

This was meant as a criticism of the popular definition of *knowledge* as *justified true belief*, meaning if you believe something and it is both factually valid and verifiable, then that is *knowledge*. This sounds like a terrifically misguided post-modern idea of knowledge because, by this definition, the dancing-woman-in-the-dots *is* knowledge, as it satisfies all 3 conditions. By this definition, *understanding* is vulnerable to subjective perception, which has its own merits but is worthless, even destructive, when it comes to understanding the objective aspects of the laws of existence. If we do not have concepts collectively agreed upon for sharing, we will quickly revert to confused cave dwellers.

This critique also applies to science because if “Something is real when it is a necessary ingredient of a theory that correctly describes what we observe”, then in the *cow in the field* problem, scientifically speaking; the cow *was* in the field… but, it wasn’t.

Simply *knowing* the details of a situation is not the same as *understanding* them. We can see this in countless confusing or challenging situations that demand critical decisions that inevitably fall prey not to our understanding of the challenge but to our conscious or unconscious beliefs, desires, and fears. We can see this difference even in less dramatic situations, such as knowing all the details about camping and understanding what camping entails or the difference between the map and the terrain.

A better definition of understanding might be "the knowledge of something sufficient enough to make verifiably accurate statements regarding said thing".

Verification

But this, too, falls short depending on what *verifiable* means. For example, 4 people have to solve the following puzzle:

What is the following number in this sequence? 91715

Bob says "1", and Carol says "3". Bob defends his answer by showing that 71 is 20 less than 91; therefore, 51, being 20 less than 71, is the obvious pattern. Carol, however, says it is 3 because 917153 is, in fact, a sequence of numbers in *pi*. Ted also says "1" because 9+1=10, 7+1=8, therefore $5+x = 6$, so x must be 1. Alice says "9" because that would result in 3 prime numbers, 11, 13, and 17 using the 2D lattice she made to solve the problem.

All 4 people have an understanding of the problem and the ways in which it can be solved, and therefore all 4 answers are verifiable. It's not unlike when you ask a child what 1+1 is, and she confidently answers "6". When asked why 1+1 = 6, she says: *"I had 1 white cat and 1 gray cat, now I have 6 cats; 2 white cats, 2 gray cats, a black cat, and a cat that is all colors"* referring to her 2 cats and their 4 new kittens. Not only did 1+1 equal 6, but it came in many colors and was soft and cuddly.

As silly as this sounds, her answer was quite accurate given the context and the scope of a child's understanding and the context of *"1 (female cat) + 1 (male cat)"*, which is not at all an irrelevant detail, especially to the cats. We can see the "error" here as the child not being able to appropriately identify the differences between the overlapping contexts of math and animals. We should not be quick to judge this child because we have to assume that even the greatest thinkers will make the same "error", albeit with more complex contexts. After all, this discernment is a product of our neurology, the brain being a big pattern recognition machine. Unless we have the ultimate brain, we can't recognize everything.

Understanding is contextual and only relevant to the degree to which it applies to the matter in question and why it was asked in the first place. Even the concept of "1" is contextually relevant. We may have 1 dollar or 1 day, but what does 1 mean if we say 1 puddle plus 1 puddle? We either have 2 puddles, or, if they are connected, we have 1 big puddle, and now "2" is not the unit count of puddles, but the relative volume

of the puddle, i.e., 1 puddle that is twice as large. If we drop 1 rock into a lake, we have 1 wave function. If we drop 2 rocks into a lake, we have 2 wave functions that interfere with each other. So we could say:

"1"=$A\ sin(kx - wt)$ as this is the general description of a wave.

"2"=$A\ cos\frac{\varphi}{2} sin\left(kx - wt + \frac{\varphi}{2}\right)$ as this is the description of two waves interfering with each other.

What happens if we take 1 particle traveling at *x* speed and smash it headfirst into another particle traveling at *x* speed? You might think that the particles smash into each other at the speed of *2x*, but you'd be wrong if *x* was the speed of light because, at the speed of light *1+1 = 1*, at least according to the Theory of Relativity.[91] More specifically, the product of the 2 opposing speeds, when multiplied together, can never *appear* to exceed *c*, the speed of light, so here 1+1 could equal any of the infinite values between 1 and 2.

Other living creatures share our ability to count, the main difference being the concept and application of "counting". For example, fish can count in the sense that they can measure the relative size of a school of fish, so they have a concept of *greater than* and *less than*, at least. This is a helpful skill as the size of the school is directly related to their chances of survival. Frogs can count as well as perform addition; a female frog (from one species) measures potential mates by the number of croaks they can make in a row, so at some level, she is calculating "Contestant #1 croaked 5 times, but contestant #2 croaked 6 times", and because the males are competing, contestant #2 had to "count" the croaks of contestant #1, then add 1, and then count down his own 6 croaks [92].

In many animals, there are *accumulator* or *counting* neurons whose job is to send out a signal every time something is *recognized*, and by *recognized*, we mean the information that can be processed by the rest of the brain, i.e., the neurological component of a concept. A monkey will "count" the bananas in a tree, but it won't "count" how many people in the plaza are wearing Gucci. In some creatures, including humans and fruit flies, the *timeless*, or *tim*, gene is critical to the "counting" necessary for managing the inner circadian clock. More sophisticated counting comes from networks of neurons collecting and sharing data.

Knowing how many bananas there are, or knowing that *n*+1 croaks are better than *n* croaks, is the application of information to some context, such as food or mating, and that is the definition of knowledge.

Key 53: Knowledge is the application of relevant information to a context.

Imagine how humans might count if/when our neurology is far more evolved and interconnected. Will numbers seem quaint? Will we one day be able to process information analogously rather than with discrete digits? Nature is analog (or at least appears so), and analog systems solve problems as fast as physics allows, so perhaps that is inevitable, and one day, numbers will no longer be necessary.

Reality, as we know it, depends on the context of not only what is happening (stateless) but all that had happened before (stateful), in whatever contexts the contributing events happened in, most of which we can only speculate on. Our understanding of anything can only be relative to our context and valid within that context.

So, let's modify the meaning of understanding to the following claim:

Key 54: Understanding is the knowledge of something sufficient enough to be able to make verifiably accurate statements regarding said thing within the context of its current application.

With this definition, Bob, Carol, Ted, and Alice can make statements based on their understanding, but none are verifiable unless we know why the question was asked. If the point was to see if they had reasoning abilities, they were all right, and so was the little girl, according to their relative reasoning abilities. The specific question itself is irrelevant, as any number of questions could be asked to get the same results. If the point of the question was to try and recover the last digit of a telephone number, there's a 10% chance any one answer is correct, including the little girl's answer, and the question was still meaningless.

We can now answer the question, "How do we define *information*?" If we accept that all data is valid and is, therefore *information* that is merely undiscovered due to our limited understanding of its relevance to context, *information* now can be defined as the following claim:

Key 55: Information is relevant data that we know how, when, and where to apply, given our understanding of the application context.

In short, information is *relevant data*.

Data to Information

Data, being an abstract by-product of everything, is, by itself, meaningless, just as the existence of matter is, by itself, meaningless. Data alone is the conceptual equivalent of chaos. It creates nothing and has no energy, meaning, direction, form, or pattern. The only value that comes from data is in how it relates to a data-frame, the ordered system of archetypes that are numbers.

Key 56: Data alone is chaos.

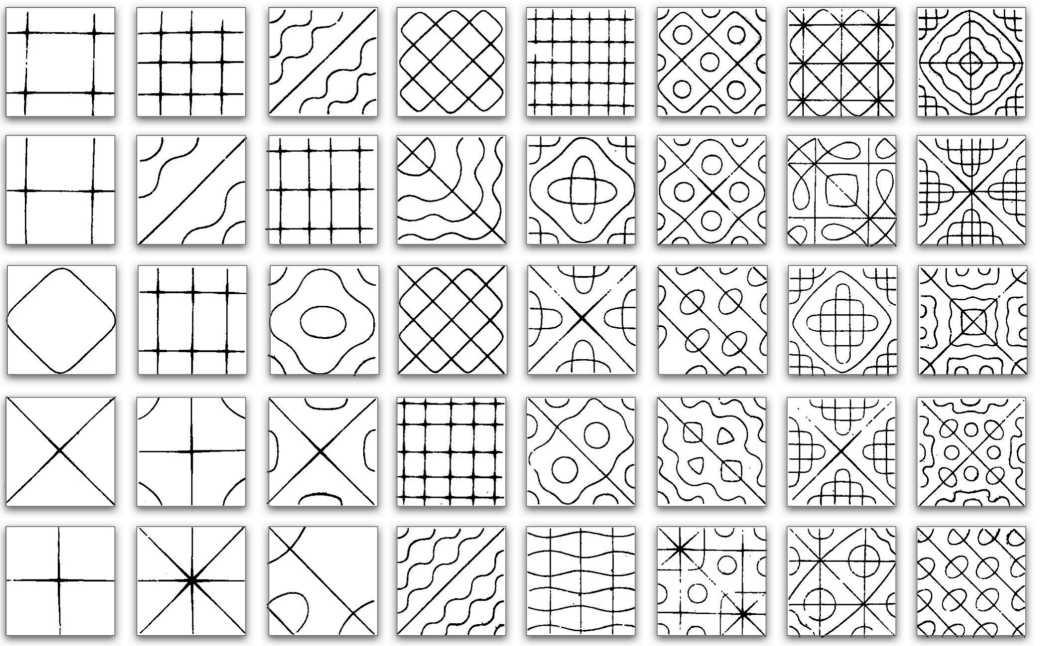
Information, at least one form of it, is when we can find patterns or laws in the chaos of data or apply data to an existing pattern or law. We can go so far as to say *information* is the result of energy being applied to data.

There are many examples of this in nature, of order emerging out of chaos. One of the more straightforward examples is the *standing wave pattern*.

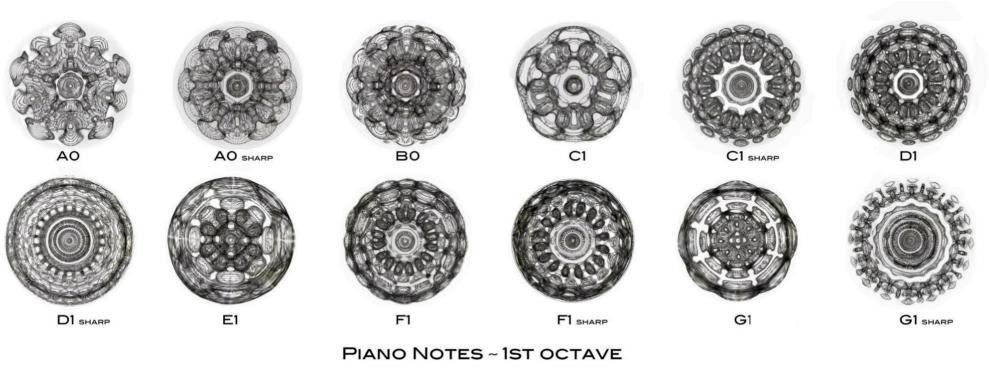
Standing Wave Patterns

For those who do not know what a *standing wave pattern* (SWP) is, it is a stable pattern that results from cycles of energy transmitted as waves interacting with matter.

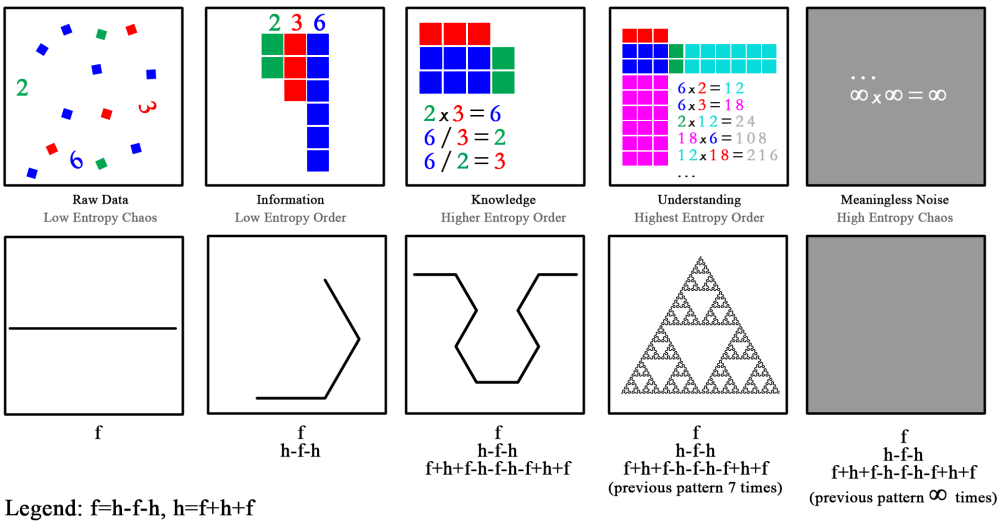
Here is a collection of SWPs created by placing white powder on a drum head and exposing that drum head to various stable sounds, like a single tone or a collection of single tones. This process is called *cymatics*.



Here are some more complex cymatic patterns from the 12 notes of the 1st octave of a piano.



The difference between data and information is analogous to the difference between chaos and order, that difference being entropy and energy.



Above are two examples of this concept. In the upper image, we show the example of some random data. In the lower diagram, we show the evolution of what turns out to be a self-similar pattern (described using the *L-System* language).

Raw data is a form of low entropy chaos. Why? Because as these values have no context or meaning, they are nothing more than random, abstract symbols. There is nothing they can "do"; data alone has no microstates. Raw data is *potential* information, not *kinetic* information (to borrow the concepts of physics)

Information results from applying energy to analyze the data, producing limits, patterns, and relationships. In the example in the image above, the context is that of simple math functions. Information equates to *kinetic energy* because it is data that can be used. From our raw data, we discover the relationship between these numbers.

Knowledge is then produced when we apply this information in some meaningful manner. Knowledge equates to applying kinetic energy, such as running a motor or boiling water. In this case, we have gained the knowledge of how these numbers relate to each other and can apply this knowledge to such things as the laws of motion, electricity, Relativity, etc.

Understanding is when we extend this knowledge to understand the larger perspective and how it may apply to other scopes and contexts.

Noise is when the growth reaches a point where no more contextually usable information exists. This is a deterioration of that knowledge in that the amount of contextually unusable data from a *system* becomes so great that the relevant information is lost. At this point, the system is simply one of chaos. The knowledge we have gained is not lost, but the system we used to acquire it has reached its limit. An example of this might be how when speed, gravity, or momentum get too big, Newtonian mechanics spits out garbage data, and you need to move to quantum gravity to find the order in the data. On that note, it's worth pointing out that Newton's laws of motion, Relativity, and quantum theory operate in 3 different scopes which overlap and interact. As mentioned previously, the laws of one scope may not be valid for another, so applying laws from one scope to another will introduce some garbage results. Still, given that there are scopes within scopes, we may find the *uber*-scope that all these scopes exist within, something like the scope of the *Unified Field Theory* or the *Theory of Everything*.

Another point to consider is how all data, information, knowledge, and understanding that we acquire from investigating our reality are just as vulnerable to decay due to entropy as the matter that our reality is built from. This is because all the above forms require matter to survive; the brain that holds this knowledge, the book it was written down in, the DNA it was encoded into, or any other form of recording will eventually deteriorate, taking with it the knowledge and eventually returning the data-matrix back to the chaos of the infinite pool of meaningless abstractions. Sadly, history has many examples of the permanent destruction of knowledge, and it's statistically inevitable that at some point in the future, humanity will be reduced to foraging barbarians, again, as has happened in the past.

We have moved from *data* to *information* to *knowledge* to *understanding* in the following manner, more or less.

- Data + *order* = information
- Information + *context* = knowledge
- Knowledge + *application* = understanding

What comes next? How do all these *understandings* we have discovered relate to one another?

Attempting to answer this question gave rise to the entire field of Western philosophy. The word *philosophy*, which literally means "love of wisdom", was invented 2,600 years ago by the Greek mathematician, philosopher, and religious mystic, Pythagoras, as the field of study dedicated to understanding how reality is put together. A few years later, Parmenides, perhaps the most profound and challenging thinker of the

Greek philosophers, came up with the idea of categorizing all that was understood about existence. Today this is called *ontology*, which is hierarchical in nature and comes from the Greek “the study of that which is”.

Historical note: While Parmenides changed the course of philosophical thinking, many of his ideas were considered preposterous, such as the idea that all of reality is an illusion… which, after 2,600 years, with models like the *Simulation Theory* and the *Holographic Theory* of reality, is almost mainstream thinking.

> *… unborn and imperishable, whole, unique, immovable, and without end. It was not in the past, nor yet shall be, since it now is, altogether, one and continuous*

He warned that the senses give us false information as they only sense the illusion of reality. Only reason can be trusted. This branded Parmenides as an “extremist”; today, he is still classified as an *extreme rationalist*. Not surprisingly, his arguments were based on the rational premise that something either “is” or ”is not”… a recurring theme in history and this book. Parmenides also appears to be the first Western philosopher that introduced a formal concept of *nothingness*. His idea that the act of *becoming* is an incoherent concept is explained by his contemporary, Gorgias, in an argument that was reasonable for the time:

> *What is cannot have come into being. If it did, it came either from what is or what is not. But it did not come from what is, since if it is existent it did not come to be but already is; nor from what is not, for the nonexistent cannot generate anything.* ***~Georgias***

In other words, something can’t come from nothing. The tholonic model, as will be explained in painful detail, is precisely the opposite: everything comes from nothing. Ironically, the tholonic model uses many of the same arguments and reasoning as Parmenides.

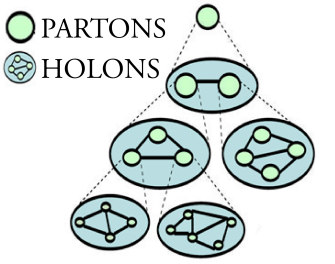
Key 57: All information is hierarchical.

Needless to say, there has been a lot of discussing, researching, and testing over the past thousands of years on the best way to organize or knowledge of “that which is”.

Holarchies

In 1972, Ervin Laszlo, philosopher, theorist, and two-time Nobel Prize nominee, published “Evolutionary Systems Theory. Introduction to Systems Philosophy: Toward a New Paradigm of Contemporary Thought”.[93] In that book, he incorporates *Living Systems Theory* and the hierarchical structures of Mario Bunge, an Argentine philosopher and physicist and a giant in the field of semantics, ontology, epistemology, philosophy of science and ethics, and recipient of twenty-one honorary doctorates and four honorary professorships by universities from the Americas (North and South) and Europe.

Laszlo's challenge was to provide a framework for understanding universal structures that span the scopes ranging from subatomic physics, biology, chemistry, organisms, and social systems to the cosmos. Laszlo describes a hierarchical model of interconnected conceptual entities. When one of these entities is acting as a *part* of a larger entity, it is called a *parton*, and when acting as a *whole* entity with its own parts, or *partons*, it is called a *holon*.



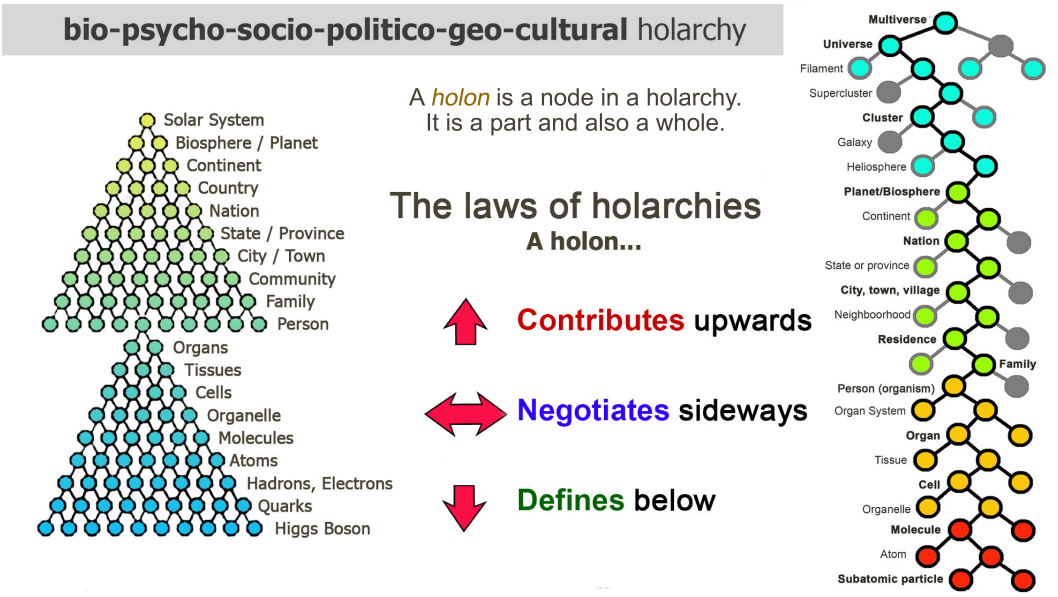
The *holon* represents the *wholeness of its nature*, and the *parton* represents an integrated *part* of the greater *holon*. The hierarchical ordering of *holons/partons* is called a *holarchy*. An example of this is the biological cell mentioned previously. The cell itself would be a *holon*. The transcoder and other components necessary for the cell to function would be considered *partons*. Likewise, the transcoder is also a *holon* with its component *partons*, and the cell itself is a *parton* to, say, an organ. This makes the holarchy fractal in nature, as the structure of the entire hierarchy is self-replicated in each holon.

The most fundamental properties of holons are:

- Each holon has its own parameters, laws, and context.
- A holon can spawn new holons as partons.
- Holons, or archetypes, are interdependent on one another (as stateful systems), as well as independent (as stateless systems).

Key 58: The structure of information is fractal (self-similar and redundant)

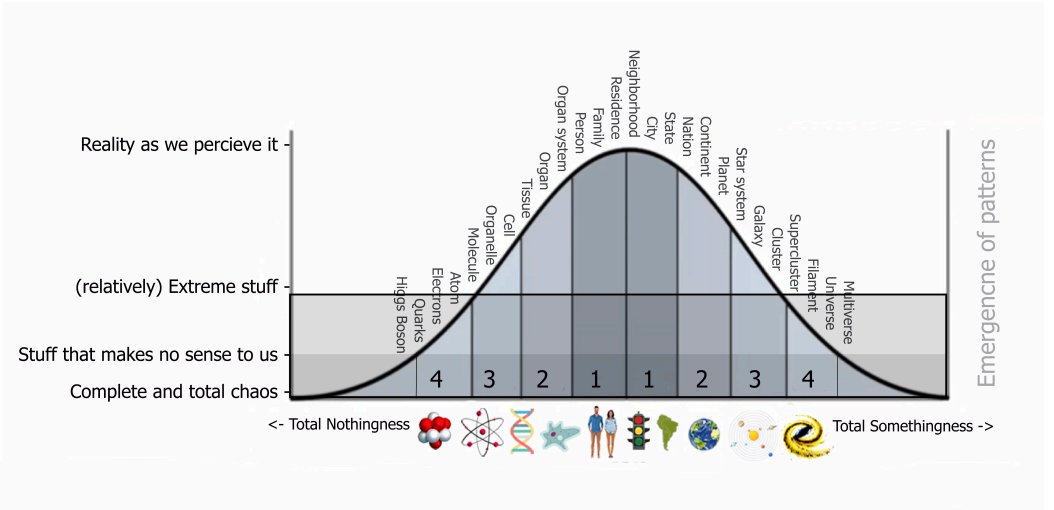
The holarchy is meant to be a map of all the concepts of archetypes we have collected, and it attempts to organize these concepts in a hierarchical fashion where each parton is a child of a holon. Here we apply our concept of scope as each parent has properties that the child inherits, i.e., within the holon of *person,* you will only find *person* things and not *planet* things. Each holon then has a unique scope, which defines the spectrum of possibilities for the partons of that holon. Now that we have a scope, we can apply the Bell curve of probability for any particular holon.



The original definitions were "A holon: looks up for what it needs to integrate, looks sideways for what it needs to complete and/or cooperate with, looks down for what it wants to control and command." Changes reflect a slightly more holistic approach.

The graphs above represent a tiny subsection of the Grand Holarchy of Everything. The chart on the left shows a larger picture of how partons and holons relate. The chart on the right shows one of the many paths that connect subatomic particles to the Multiverse.

With a few tweaks to the previous *Super-Duper Graph of Reality* Bell curve and using a log scale rather than a linear one, the concepts used in the above holarchy fit nicely.



Some readers may think, "Hey, wait a minute" those aren't the same axis! What kind of Gaussian goofiness is going on here?" Well, that is partly true. The first *Super-Duper Graph of Reality* chart shows the probability (x-axis) of where order (y-axis) will be more likely to emerge across the entire spectrum of existence, while this chart is limited to the scope of human perception.

If we assume that our perceptions of reality are reasonably compatible with reality as it actually exists (with all due respect to Parmenides), then, as probability would have it, we humans happen to be in the part of the spectrum where one would most expect to find life popping up, so, congratulations to us, we're where we are supposed to be… probably.

Because the peak of the curve represents where the most "work" will be done (given the 2 poles that define the limits of the curve), it is also where energy will most likely be able to form sustainable patterns. The peak of the curve also represents the most efficient expression of a holon's purpose and function. If we were electrons instead of humans, our archetypal holon would have the electron in the center because, as the electron *does* exist, it would naturally occupy that point where its existence is most likely, which is at the peak of the curve for the electron holon. However, because life forms will tend to exist at the peak of the curve that spans from quark to Multiverse, perhaps we can speculate that life itself and the expression of consciousness that evolved from life is a very efficient expression of energy. This is not to say that there are no other forms of life that may excel in this regard, especially where radically different contexts may apply. Still, if there are other forms of life in our corner of the Universe, they will most likely appear within the same range of the curve. More than appearing in the same area of the curve, they will probably appear similar to earthly life forms. If the aliens ever land a UFO in Central Park, we will all be surprised and a bit disappointed, I suspect, when what emerges looks unimpressively human. At least that is the opinion of the University of Edinburgh's Astrobiology professor Charles S. Cockell, as he spells out in his book *The Equations of Life: How Physics Shapes Evolution*. However, by his same reasoning, there is a chance it could look like some of our own highly successful life forms, such as lice, crocodiles, duck-billed platypuses, horseshoe crabs, immortal jellyfish, or the highly intelligent octopus, to name a few.

Human-looking or not, all creations are subject to the three attributes of the holarchy as noted above; **negotiation** (cooperation or conflict), **definition** (limitations of environment and resources), and **contribution** (maintenance of sustainability). Oxford University's evolutionary biologist Sam Levin sums this idea up quite well in his paper "Darwin's Aliens":

> *[Aliens, like humans] are made-up of a hierarchy of entities, which all cooperate to produce a [lifeform]. At each level of the organism there will be mechanisms in place to eliminate conflict, maintain cooperation, and keep the organism functioning. We should expect [aliens] to have been favoured by similarly restrictive conditions [as us humans]. Thus, we can make specific predictions about the biological makeup of complex aliens.* 94

We take the position that it is these same forces that apply to all existence, not simply biological life.

Another excellent example of both a holarchy and its self-similar nature is that of the neurological structure of the brain's processing ability, along with the structure of language that evolved out of that structure. This also shows examples of the various scopes through which instances are expressed. The 1st column on the left is a hierarchical structure of a sentence. The 2nd column shows the speed at which the brain processes each part of the hierarchy. The 3rd column shows what (proposed) part of the brain is contributing to the overall process, and the 4th column shows the scope and size of that part of the brain.

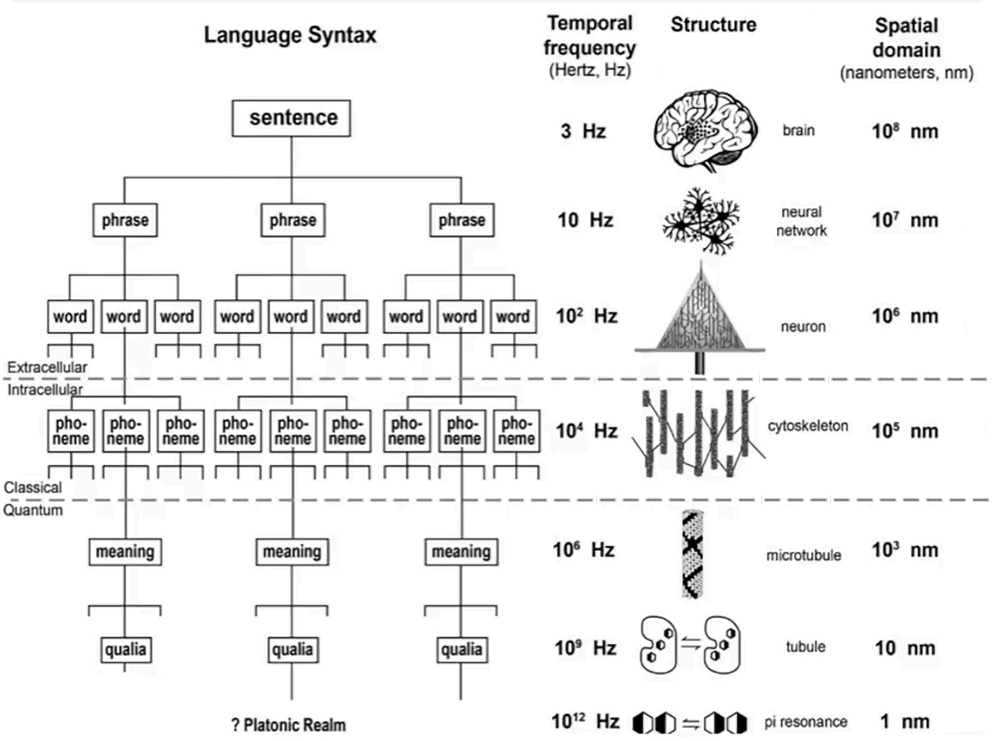


Image from Stuart Hameroff's lecture "Is Quantum Physics Necessary for the Account of Consciousness?"

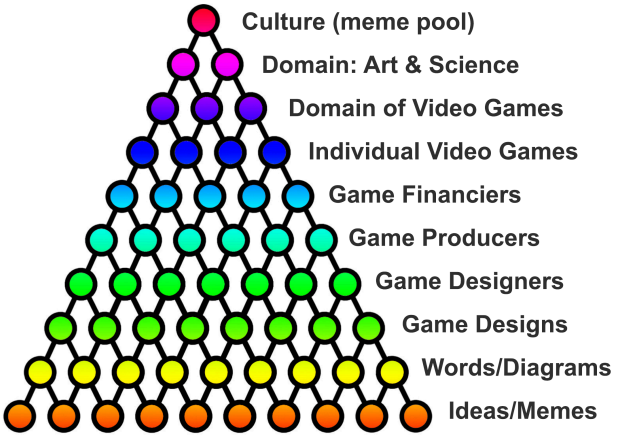
Memes

More recently, this holarchical model was applied to Richard Dawkins's concept of a *meme* [95]. A meme is defined as:

> *an element of a culture or system of behavior passed from one individual to another by imitation or other non-genetic means.*

In Dawkins own words [96] :

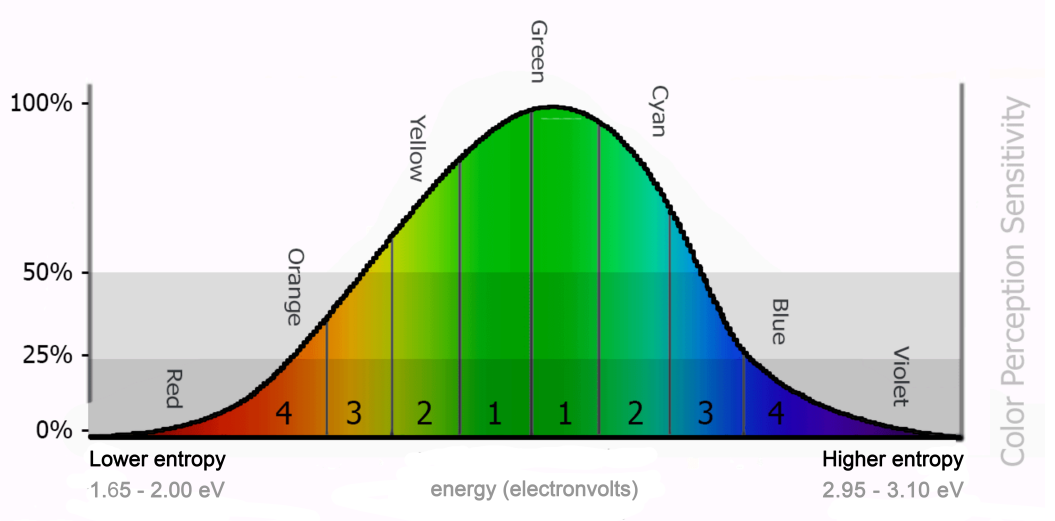
> *"Memes spread through the culture like genes spread through the gene pool."*



The relevance is the demonstration how the concept of a meme is incorporated into a holarchy. The original version of the chart above comes from a paper on video games and their potential to increase intelligence.[97] The interesting part is how Velikovsky puts the meme at the bottom of the cultural branch. It is interesting because it defines a meme as a 7th-generation descendant component part, a particle, so to speak, of the *uber* concept of *culture*. The meme here is analogous to what the electron is to the atom, the atom to the molecule, or the molecule to the object. He also puts *ideas* down there as well, which may be consistent with the way he defines an idea. In our case, we are defining *Ideas* (capital "I"), like forms, as the archetypal blueprint for many instances of ideas. The idea of *"Let's make a video game where people have to shoot each other"* is an instance of the archetypal Idea *"Individual or tribal competition and survival"*, which also spawns such concepts as sports, war, predatory capitalism, the idea of winning, etc. The idea of *"If I sin, I will burn in hell"*, a very resilient and popular meme for thousands of years, is an instance of the archetypal Idea *"We are judged harshly by our superiors for being self-serving"*, which spawns such concepts as karma, judgment day, guilt, original sin, etc.

The holarchy examples shown above are portrayed as 2-dimensional bifurcating trees. This model hides a lot of information, for if we zoomed in, we would see that within each holon is a collection of holons that share an idea, purpose, function, etc. Each holon has its own parameters, laws, context, etc., and each holon, therefore, has its own Bell curve that shows where it is best suited to "work", such as the Bell curve of the human eye sensitivity, which would be one holon of "human eye".

For consistency, here is the human eye sensitivity chart, which represents one aspect of a holon of *human eye* in the *bio* branch of the holarchy and its natural Bell curve of efficiency, or "work".



These Bell curves of probability are not shown, or even defined, in the holarchic model. The reason is that the holarchic model does not have the explicit concept of a duality, though it's implied. As a result, the holarchy cannot show how the Bell curve of a holon is made up of the integrated aggregate of the Bell curves of its partons within the context of the holon. It does show the parameters of the holon are defined by its parent, but the ultimate parent of the holarchy is the Multiverse, which is, in our view, the "bottom" of the hierarchy of reality as we know it as, and the "seed" of of the *tree of reality* begins with the first and smallest particle which is the 0-dimensional dot. In some way, this is like arguing which is the "correct" way to view Earth, north at the "top", or south at the "top", but it does play an important role a little later.

What happens if we incorporate the idea of dualities into the holarchy? Let's see, but first, let's look at some important concepts behind *structure*.

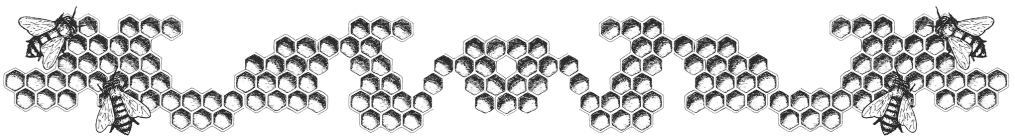
Part II

7: STRUCTURE

Knowledge and information, like form, have structures that follow the same rules as form.

Synopsis: *Structure is the relationship between elements, so anything that relates to anything has a structure. This is also true the conceptual structures of data, information, knowledge, and understanding, all of which are limited and defined by order, context and application and all of which are formed by relationships. Structure is self-similar, therefore it hierarchical in nature. All instances of a structure share the same fundamental properties of that structure.*

Keywords: *structure, hierarchy, dimensions, form, geometry, knowledge, holons, tholons*



Everything up until now was to introduce some of the main concepts that we will be returning to and depending on as we move forward an into the main ideas that led from the ultimate simplicity of a duality to more complex structures that describe the reality we actually live in.

On a practical level, this complexity is no different than how we deal with the physical world in our every-day lives. When you hold a brick in your hand you are holding trillions of atomic particles, with countless interactions, fields, energy levels, etc., but you don't need to know that to build a house of bricks. When you drop the brick and it falls, you're not thinking about the nature of time, gravity, and warped space. Likewise, to manage the "bricks" in the realm of Ideas, you also don't need to know all of the details, but it is helpful if you have an understanding of how they generally interact with each other so you don't try and build a "house" made of "bricks" and "oranges".

That said, let's touch on one more concept that is fundamental to structure in general.

How Many Dimensions Are There?

A lot, if we consider the extra dimensions that Relativity hints at or that String theory requires, but we won't be considering them here and will stick the obvious dimensions.

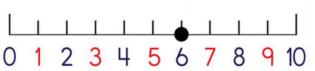
There are two concepts of dimension to consider, *location* and *instance*.

The location of a thing relates a thing to its environment and assumes that the thing we are measuring, the environment it exists in, and the measurer all share the same reality. There's no arguing that material things are 3-dimensional, and that our environment is also 3-dimensional. Sure, there may be more than 3 dimensions, such as time, but there are at least 3 dimensions that are well established and very persistent.

The measurement of an instance of something, an object, is absolute, relative to itself. A $1cm^3$ sugar cube (and its measurer) traveling at near the speed of light will still measure $1cm^3$ ...to the measurer. To a stationary bystander, that sugar cube will appear to be the size of a Borg Cube mothership, and certainly not $1cm^3$. This is due to Relativity, but the point being made here is simply that the consistency of our 3D world is due to the fact that we, the planet, and everything in our reality. are all in the same space-time neighborhood.

Longitude, latitude, and altitude works perfectly well for geographical locations, as does right ascension, declination, and distance for celestial locations. 3D coordinates work because, and only when, all things are generally in the same neighborhood of space-time reality. We ignore the differences in our own neighborhood because they are too small to bother with, but they exist. If you fall from 100 feet in Peru, you will hit the ground 16 milliseconds sooner than if you fall in the Arctic. Peru has more gravity than the Arctic, and that means time moves slower in Peru, but no one is going to notice or care, just like we don't notice that in every second of our life we are traveling at least 3,000 miles per second across various dimensions given the speed of the Earth, Sun solar system, galaxy, etc. The point here is, *location* coordinates can *only* be relative to the local environment.

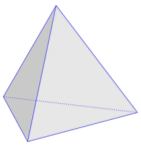
The classic explanation of a dimension goes something like *"If something has only one dimension you only need one number to know its exact location".* In the case of 1-dimension, like in the number line below, if there was a dot on number 6, the dot has a dimension of 6.



This is true when, and only when, the position of the measurer and the thing being measured share the same context, as the value of 6 is only relative to that context. If we wanted to give the absolute position of the dot, we would need to include the coordinates of where in the universe that dot exists, which would require the coordinates of who-knows-how-many larger contexts it was in when it was measured; where on the planet, in the solar system, in the galaxy, in the multiverse, and all of those with the dimension of time, as they are all moving, and even then it would only be relative to the Universe as we know it. So, even a simple 1-dimensional dot can have a lot of dimensions when measured from a broader context.

It's as if we have *subjective* dimensions, which are dimensions relative to the thing alone, and *objective* dimensions, which are the dimensions of the thing relative to all other things (the Universe), which seems ironic as this would equate *subjective* with *absolute*, and *objective* with *relative*.

Things



What can we say about what all *things* have in common? Well, we can say at least the following:

- All things have 3 dimensions.
- All things are made of other things (except the “first” thing?).
- All things are the most efficient form of that specific thing.

This last statement might raise a few eyebrows. The claim here is not that any particular thing is the most efficient form of its perfect archetype, but rather the most efficient form for that particular thing under the conditions it exists in any particular moment.

If these statements are true, then this would imply that the most primitive thing that can exist, the simplest and most efficient form possible, is the tetrahedron. It has 3 dimensions, but it is *not* made up of other things because when you remove any one point, it collapses to 2 dimensions, and no *thing* can be 2D. Therefore, it must be the very first *thing* to come into existence, at least conceptually speaking.

It can be argued that it is the sphere, not the tetrahedron, that holds this title, and this is not incorrect. From the tholonic perspective, both forms are the same with a minor difference. Let’s use the simpler example of a triangle and a circle. In one sense, the circle is more fundamental because it can be created with simply one line, while a triangle requires three lines. However, if we accept that the path of least resistance is represented by the shortest distance between two points (all else being equal), then while a circle is easy to make, is certainly not the most efficient. While a triangle is a polygon of 3 straight lines, a circle is a polygon of an infinite number of straight lines, each line being infinitely short. This then defines a circle as an infinite number of triangles. The reason we consider the circle and the triangle (or tetrahedron and sphere) the same is because the triangle is a *single* instance of the simplest form, and the circle is an *infinite* number of instances of that same form. The only difference between the two forms is *quantitative*, not *qualitative*. The circle is the most efficient form that can be produced by the most efficient form of triangle. Very little in nature and reality can be described with only a single tetrahedron, but everything can be described as multiple tetrahedrons, and a sphere is just that, it is therefore the most efficient form in nature.

As a pattern of order, the tetrahedron (and the resulting sphere it creates) is one of the first, if not *the* first, to appear in nature. When we stack spheres on top of one another, they form a tetrahedron. If we stack other shapes, the structure will be altered to the degree the shape is not a sphere, but the tendency for all things that are connected to each other will be to form a tetrahedral structure to the degree the shape of the things connected will allow. As it is the tendency of all things to become spherical, thanks to gravity in the case of matter, and entropy in the case of liquids, it is then also the tendency for things to form tetrahedral connections. Tetrahedrons are the first pattern of order and the archetype that represents the path of least resistance.

If the tetrahedron is the first thing that can be created, this would suggest also that every *thing* that exists can be reduced to a collection of tetrahedrons, and that they are the smallest *thing* that can exist (again, conceptually speaking). This might sound like a radical departure from our current thinking, but it's not *that* radical a departure as this is exactly what *Emergence Theory: A Theory of Pixelated Spacetime"* [98] claims as well.

> *In our 3D quasicrystalline reality, the tetrahedron is the smallest, indivisible unit. A 3D pixel of reality, if you will. Each tetrahedron is the smallest possible 3D shape that can exist in this reality: the length of each of its edges is the Planck length (the shortest possible length known in physics – over 10^{35} times smaller than a meter). These 3D pixels combine with one another according to specific, geometric rules, to populate all of space.* ***~ "Emergence Theory Overview". Quantum Gravity Research*** [99]

The tholonic model that this book describes suggests that the rules that apply to these 3D pixels that populate all of space extent beyond space to all of reality, including the invisible worlds of ideas, archetypes, and all forms and expressions of energy.

On the Small Side

Science has been grappling with the idea of tiny particles for some time. First, we had the grains of sand and dust, then atoms, then electrons, protons, and neutrons, then finally, quarks, which, so far, seem to be the most fundamental layer of matter. The problem is, quarks are "almost" infinitely small, which creates all sorts of problems because science has a difficult time with infinity. To solve this, they came up with the idea that reality is not made of really tiny particles, but really tiny vibrating 11-dimensional "superstrings" (and they thought this would be easier?). Unfortunately, for all the evidence they have found to support this theory they might as well have said reality is made up of angels dancing on pinheads.

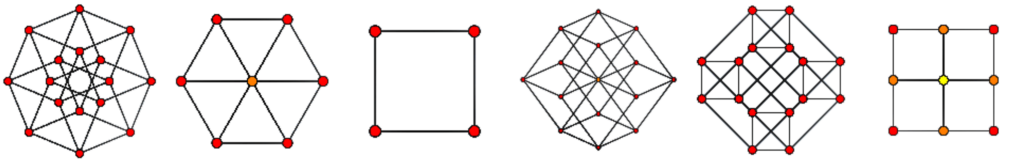
The quark remains the undefeated champion of tinyness, but "almost" infinitely small is not the same as infinitely small. How "almost" is it? One 43 billion-billionths of a centimeter (0.43×10^{-17} meters). Remember that number, 10^{-17}.

On the Big Side

Jumping to the other end of the scale we have some pretty big things in the Universe, the largest we know of being the *Hercules-Corona Borealis Great Wall.* This is a gravitationally bound galactic supercluster about 10 billion light-years wide. That is pretty, pretty big. What could be bigger than that? How about something with 4 dimensions? Would an extra dimension increase the size of something? Well, is a 2×2×2 cube bigger than a 2×2 sheet of paper, and is a 2×2×2×2 hyper-cube bigger that a 2×2×2 cube? What would a 2×2×2×2 cube look like? In the 3D world, from one perspective

it would look like a regular cube, because we can only see 3 of the 4 dimensions, but turn it a little (in 4D space) and the 4D cube will appear as two 3D cubes, or a hexagonal prism, or rhombic dodecahedron, or a cuboid.

Here is what a hyper-cube (4D cube) looks like when it is rotated and projected onto a 2D space, like a shadow (orthographic projection).



What about something that is 5D, or 6D or 7D? Each one would be bigger by an order of magnitude. How about something that is 248D? That would be very, very big. If something was bigger than the Great Wall in 248D how small could it appear in 3D? About the size of a small travel bag!! OK, you're probably thinking *"248D!? That's ridiculous!"*

Crystal Power

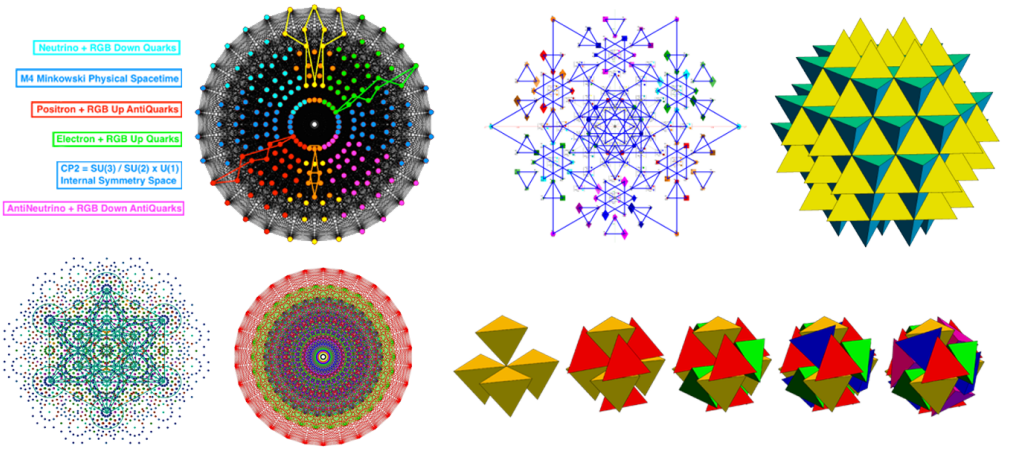
So, there's this magic 248-dimensional crystal (actually, it's 8 dimensional with 248 not-necessarily-spatial, but not *not*-necessarily-spatial, dimensional symmetries, but as an algebraic expression it is considered to have 248 dimensions... at least that is what I am told[100]) called the *E8 crystal*, and this reality of ours is, presumably, the result of a number of 3D refractions of energy created by the various facets of this crystal that are cast upon the 3D canvas of the void that is our Universe from the higher dimensions of magic-crystal-land. As modern as this sounds, this was first proposed in the late 1800s, but it has only been recently that we have the computing power to give it a test drive. This sounds pretty compatible with the Simulation Hypothesis. Maybe these two theories should get together for coffee sometime.

As crazy as this theory sounds, it's a real thing. Just do an Internet search for "*emergence theory tetrahedron*" and *"The theory of everything quantum symmetry E8 lattice"* and browse through the million-plus links that discuss it in painful detail, emphasis on the *painful* part, because most of the content is unintelligible to those not intimately familiar with the algebra of differentiable manifolds, quantum gravity and a bunch of other stuff I don't even know how to reference. However, that is not important to know for our purposes.

It should be stated that this theory is not accepted by all, and some scientists are definitely in the "swarming with worms of heretical perversity" camp regarding the magic crystal of reality. I don't have any opinion about the Emergence Theory (ET) other than it sounds fascinating, mainly because I am not qualified to have an opinion. The only reason it is being mentioned is because ET supports many of the claims that are made here, which were arrived at with no knowledge of ET.

This E8 lattice (that's its technical name, also called a *quasicrystal*, but *magic crystal* sounds much cooler) seems to be able to describe all sorts of things: space-time (both types, Minkowski and Kaluza-Klein versions. Yes, we have two types of space-time, because it's always better to have options), fermion particles, gravity, subspace, dark matter, quarks, positrons, neutrinos, Fibonacci relationships, and a bunch of other stuff, including "ghost particles" (which are really, really old neutrinos that were created during the Big Bang 15 billion years ago and have no charge, no mass and do not interact with any of the forces that form matter. Doesn't that make them simply *concepts* only of something that once existed?).

Obviously, it is impossible to visualize such a crystal as it has countless patterns in the 3D world, but here a few of these ways it can be perceived.

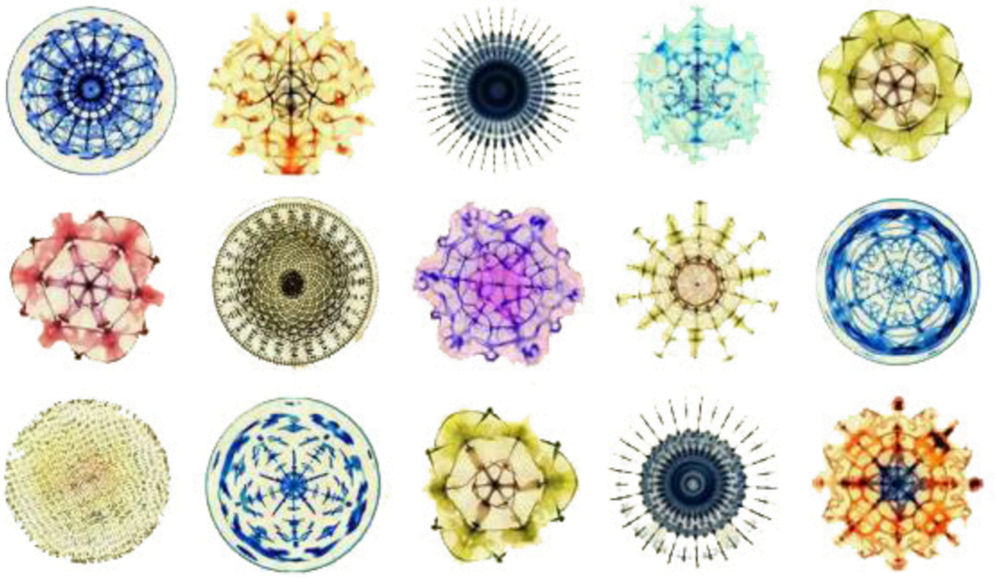


As you can see, the whole space-time part of the E8 lattice is just a small part of one of the 3D projections of an 8D slice of a 248D super-thing, leading one to wonder what other forms of reality it has the magic power to conjure up. Not surprisingly, this E8 lattice can be deconstructed to (or perhaps is constructed by) a series of tetrahedrons. [101, 102]

A significant aspect of *Emergence Theory* (for us) is their claim that:

> *...all of reality is made of information. What is information? Information is meaning conveyed by symbols. Languages and codes are groups of such symbols that convey meaning. The various possible arrangements of these symbols are governed by rules.* [103]

Just as a fun comparison, check out the following cymatic patterns. With very little effort we can imagine how reality and the Universe is like a 248D drum filled with energy and vibrating in all frequencies.



The E8 crystal of *quantum symmetry* and *emergence theory* hypothesize that all matter is a projection of countless “pixels” that are really, really small tetrahedrons [104], each about 1.61 x 10^{-35} meters in size. Remember the size of a quark, 10^{-17}? This is a *lot* smaller.

It might sound like this is mixing apples and multidimensional oranges, using definitions from *emergence theory* on one side of the scale, and definitions from *quantum symmetry* on the other side, but both of these theories integrate quantum mechanics, general and special relativity, the standard model and other mainstream physics theories to form a complete, fundamental picture of a Universe unfolding from implicity to explicity. The main difference between these two models is that the *E8 Crystal* describes the mechanics of creation, while the *emergence theory* attempts to describe the syntax of its operation using the language of geometry.

Key 59: Geometry and mathematics are the language of archetypes.

Here we have a duality that encompasses the entire spectrum of 3D reality, at least. On one end, the *alphahedron*, which is the smallest structure theoretically possible, that being the tetrahedron, and on the other end, the *omegahedron*, the most complex structure in existence, which currently seems to be the 248D-ish magic crystal.

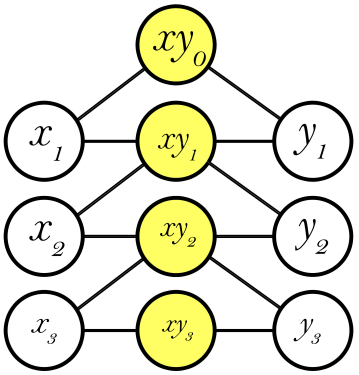
The Structure of Knowledge

Now we can begin to integrate dualities into the holarchy.

Key 60: Just as subatomic particles are structured energy, atoms are structured particles, and molecules are structured atoms, information is structured data, knowledge is structured information, and ideas are structured knowledge.

Key 61: The concept of a thing and the thing itself are the same things on two different levels of order.

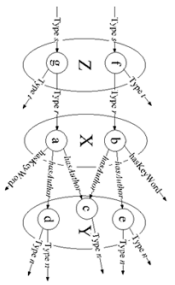
Both scopes of matter and ideas represent how a form of pure energy in its chaotic state is converted into order using the same laws as they apply to the relevant contexts of their scope. In one case, energy is ordered and expressed as matter and in the latter case as concepts. This is how it relates to holarchies, as holarchies can map not only the naturally occurring hierarchy of the concepts of *reality* (atoms, plants, people, etc.) but also the concept of *concepts* (domains of science, religions, culture, etc.).



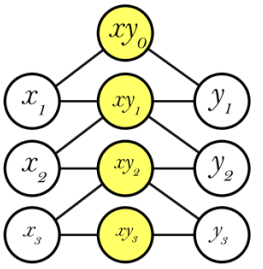
If we applied our ideas regarding duality to the holarchy it would look something like this graph (above): We start with a concept XY_0, followed by its thesis Y_1 , *which creates its antithesis* X_1* . Within this duality of X_n and Y_n , or thesis and antithesis, arises the synthesis that acts as the seed for a new concept XY_1 . The holarchy can only accommodate the central column of concepts as it has no model of a concept being born within a duality.

This graph only shows one instance per duality, but there could be many, many instances for each duality, the occurrence of which conform to the Bell curve as defined by the X_n and Y_n limits of each new pair.

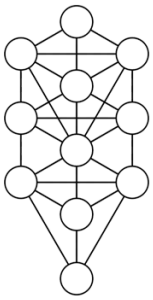
Some readers might recognize this graph as looking very similar to the mystical Kabbalah, or the Tree of Life, as it is also called, which has its roots in ancient Sumer. There was no intention to arrive at such a comparison, but these similarities naturally arise whenever we are using reason to explain how reality works regardless of its understanding being scientific, mystical, or otherwise. Any system that has order will follow a pattern, and we can see these same patterns over and over again, from the electron to the galaxy, from flowers to computer networking. Our explanations of how realities work, whether we believe it was created by God in 6 days, or it's all a very sophisticated holographic projection, will have the same patterns of reasoning, albeit with different back-stories and interpretations of the significance of those patterns.



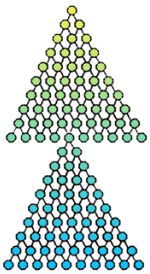
Semantic Web
Similarity Graph



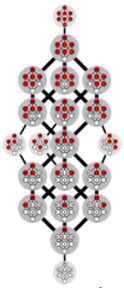
Tetraholarchy Graph



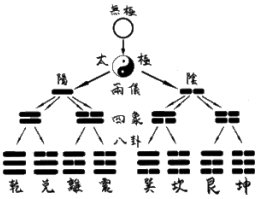
Kabbalah



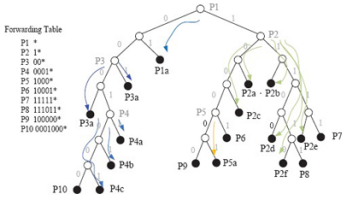
Holarchy



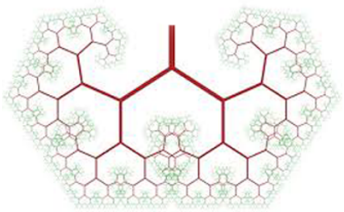
Monotonic
Boolean Lattice



Taoist I-Ching



Computer Interconnection
Packet Routing Network



Binary Tree

Knowledge by any other name

Tibetan Buddhist and Taoist meditation/visualization

The image above is from a *Neidan* (Chinese inner alchemy) Taoist training manual of the 17th century [105]that comes from an oral tradition dating back to the 8th century attributed to the legendary Chinese scholar Lü Dongbin of the Tang Dynasty. We can see the same pattern here in concept, but rather then the ordered, linear, “Cartesian” bifurcating diagrams above, it uses the classically Eastern artistic, poetic, style to demonstrate a visualization technique of centering one’s self in the middle of one’s

5 “shadow-geniuses” each of which with their own 5 “shadow-geniuses”, creating a self-similar *pentafurcating* tree. The purpose of this meditation is to “*crystallize the spirit in the Elixir-field, the place of energy (solar plexus)*”.

Note: “Shadow” here does not mean something negative, as in the Western concept. The description of these “shadow-geniuses” is “The pure and light energy rises upward and floats up to heaven and becomes the five-fold present shadow-genius”, suggesting that “shadow” is synonymous with “component of”, or what we would call a “parton”.

We tend to think that ancient ideas were not based in science, at least in the way we describe that word today. This is partly true, in that we had not yet discovered the laws of nature to the degree, or in the manner, we now have, but we can find incredibly sophisticated reasoning and logic in some ancient ideas.

Kabalah	I-Ching
32 archetypal states	32 pairs of hexagrams
10 stable states	10 pairs of balanced hexagrams
22 dynamic states	22 imbalanced pairs

Take two examples mentioned above, the Taoist I-Ching and the Kabbalah. Both have a tremendous body of impressive intellectual reasoning, and both are descriptions of the same larger concept of a reality that exists in a duality as seen through the contextual cultural lens of understanding. While the Kabbalah is a top-down model of creation that describes 10 archetypal states 32 archetypes made up of 10 archetypal states of existence with 22 archetypes of energy that connect these states (and based on the Hebrew alphabet of 22 characters and 10 numbers), the I-Ching is a fractally bifurcated whole of 10 pairs of balanced states and 22 pairs of imbalanced states that describe 32 pairs of archetypal states of the Tao.

The story of the I-Ching and Gottfried Wilhelm von Leibniz, the co-inventor (along with Newton) of differential and integral calculus, is a fascinating story that exemplifies this cultural lens. It’s a bit of an aside, but it’s relevant and worth the read.

Leibniz

When the Jesuits, reputed to be the intellectuals among Christian missionaries, traveled to China, they were so fascinated by the I-Ching that they brought it back to Europe in the late 1600s. It was here that Leibniz saw the I-Ching and claimed it to be sent to him by God.[106]

Prior to seeing the I-Ching, Leibniz had been developing (discovering?) a number system since 1679 that he considered sacred and which he described in his 1703 article, *Explication de l’Arithmétique Binaire*. It was the binary system of 0s and 1s, much like the Yin/Yang of the I-Ching. It was of no real practical use to anyone at the time, but that was not why he developed it. Leibniz, a very pious man, thought that if all values could be expressed in terms of only something and nothing, on and off, yes and no, positive and negative, etc., then truly, this would be the language of life, for, as he thought, God the Creator was represented as 1, while the void was represented as 0.

Leibniz's principal work on this topic was his ideas on *monism*, as he called it. In short, he describes how each substance is *programmed* to act in a predetermined way and is integrated with all other substances according to a preexisting *archetypal* harmony. The most, and only essential substance was the simplest, which he described as "that which is one, has no parts and is therefore indivisible" and from which all other substances emerged from, i.e. God.

At the same time he was inventing this *divine math* meant to explore the hidden secrets of reality, he was also inventing the first mechanical calculator suitable not only for addition and subtraction but for multiplication as well. His dream was to make a logical thinking device.[107]

Leibniz was creating tools for exoteric and esoteric understanding, both based on the same logic, but within two very different contexts. Leibniz's sacred math was lost to obscurity, until it was (coincidentally) resuscitated some 300-years later at the predawn of the digital computer.

To synopsize the entire digital revolution into one paragraph, imagine one of these digital pioneers saying: "I've got an idea. let's develop a component that will act as a conductor when a certain amount of voltage is passed through it, and an insulator when no voltage is passed through it. We will call this component a 'gate'. Because this gate can only respond to one of two states, high or low voltage, yes or no, so to speak, which represents the most basic principles of reasoning, we will call it a 'logic gate'. Any problem that can be reduced into so many yes-or-no conditions can be calculated by these logic gates. We can use the numbers 1 and 0 to represent these states as digits. Because the heart of these electronic machines will be made up of these yes-or-no circuits, we will call them *'digital circuits'"*, and the digital computer as we know it today was invented.

If Leibniz was alive today to see his sacred binary math of 1s and 0s being used as the language of his 'thinking machine', ushering in the greatest transformation of knowledge ever known to Man, he would recognize it as both a tool of practical use as well as a tool of great esoteric potential, a key to the secret knowledge he was looking for.

The Source of Ideas

We like to think we come up with ideas, but perhaps this is no truer than a flower "deciding" to change colors when exposed to different light, or a river "deciding" to change course because the wolf population has increased.[108]

Although currently not a mainstream theory, the understanding that Ideas are more like expressions of living intelligences that we have a symbiotic relationship with is currently alive and well, and has been around for thousands of years. Traditionally, these forms of intelligence and intention were anthropomorphized into deities, angels, demons, spirits, etc., and it was understood that we use them for our purposes, noble and otherwise, and they use us for their purposes, noble or otherwise. Today we have new evidenced-based hypotheses of this same concept in the forms of panpsychism,

morphic fields, collective (un)consciousness, Universal mind, etc. From this perspective, all forms of life are simply instances of various Ideas and concepts that have instantiated themselves.

One of the fundamental differences in how similar concepts evolve over time is in what and how structure is applied to the idea. Take, for example, the idea of the biblical creation story vs. reality-as-a-simulation hypothesis. We can see by their similarity that they are clearly the same concept, but one filtered and defined through the belief structures of Judeo-Christian doctrine and the other through the structured reasoning of modern science.

The above was a somewhat circuitous route to get to this point of looking at knowledge as a form of structured information and how it is not only the basis of reason but the basis of existence as well. It was stated before that the tetrahedron is the most fundamental concept of form. We are going a step further here and also claiming that the tetrahedron is also the structure that information takes when it forms knowledge.

How would we begin to test such an idea? We can start in the same way we would test the idea of a tetrahedron, by deconstructing it into its even more basic component, the triangle, and if we can discover a triad of information, we can form a tetrahedron of knowledge. We have already seen one fundamental pattern (Newton's 2nd law) that discovers a 4th point from any 3 points, so perhaps we can learn something more from just a triangle.

What follows are some examples of how we might identify conceptual trinities in a wide variety of systems of knowledge and/or information.

Language

In the realm of ideas, the most important tool that man has deployed has been language. Language transmits the reasoning behind ideas; it is how ideas evolve, how they are destroyed and how they defend themselves, which, according to Dawkins, they do, as he explains in his book "The Selfish Gene". As such, we would expect to see language embedded with the same structure as that of ideas, concepts, and forms.

Humans are sort of stuck with the language we have been using for thousands of years, and if we were to (and when we do) invent a new language it would look radically different, but it would probably function similarly because all naturally evolved languages follow a law based on mathematical statistics that also approximate the same laws of science. This amazing pattern of language was discovered in the 19th century and is called Zipf's law (which when normalized is called the Riemann Zeta Function) and is fundamental to everything from the diffraction of light to the size of craters on the moon. This is another topic, but the point here is that language evolves according to, and limited by, the same forces that drive all evolution, growth and change.

This applies to intentionally designed languages as well. In 1968, Aristid Lindenmayer, a Hungarian theoretical biologist and botanist at the University of Utrecht, designed a symbolic language called *L-system* that incorporated various symbols that were

bound by a set of rules. He developed this language as a way to model and describe the behavior of plants and a variety of other organisms[109]. The philosophy and architecture of the language were based on the observed logic of growth, i.e. life. Not coincidentally, this language describes self-similar systems. This is the language of the future, but sadly, only for our digital offspring, at least not until we do some major gray matter rewiring upstairs.

Trees modeled using the L-system fractals

Granted, L-System language is mainly used as a modeling language, but has an alphabet, grammatical roots, and rules, like human language[110]. This is brought up to show that organically evolved systems that have survived the challenges of sustainability, such as human language, exhibit similar characteristics to the highly ordered, structured, and hierarchical systems that describe life itself.

Although human language is surprisingly efficient and operates with the same structure that naturally exists in ideas and concepts, its efficiency is greatly due to our brain's ability to apply context and instantly run through many interpretations of words and sentence structure until it finds the most contextually applicable interpretation. This is entropy in action, as each possible interpretation is a microstate that the brain has to instantly field-test. Take the sentences:

> *I didn't sleep with your mother.*
>
> *I didn't hit a man with a stick.*

Say the first sentence 5 times, each time putting the stress on a different word. This sentence has the equivalent of 5 microstates, and depending on the context of who/what/where/when/why, the brain will calculate the highest probability of its intended meaning. Likewise, the second sentence has potentially 16 microstates, as there are 8 different interpretations based on stress, and 2 possible meanings as to whether the man had a stick or a stick was or wasn't used, to hit him with. Applying the concept of entropy in this scenario, *finding meaning* in the sentence equates to the *balancing of energy* between two states. But what is imbalanced that needs balancing? The imbalance is one of knowledge, as the information provided by each interpretation is quite different, and that information might be important to know. To get the answers, the brain as a built-in *intention-drive*, which is the neurology that makes one need to, or desire to find answers. This is not a well-understood process, but it is being studied[111]. The brain's built-in intention-drive is wired specifically for the purpose of discerning significance and increasing knowledge, which it has learned is a critical competitive and survival skill. Even when there is no actual information to discern, the brain can create significance. I suspect that delusional disorders are somehow related to a hyperactive intention-drive.

How does this cognitive wiring and processing work? While the physiological details of the wiring are not known, it's an educated guess that the intention-drive is a result of, and proportional to, the electrical charge in the ions that create neural signals. One clue is to look at the processing involved.

Take the following sentence:

> *I can't untie that knot with one hand.*

The meanings of words, their order, the context of who is speaking and where they are, along with many other details, come into play to turn that sentence into structured information, or knowledge, in our head. It is our brain's language processing ability that converts the often messy structure of words into meaningfulness. Were language more structured we might say this sentence as:

> *Not [I [Able [[[Make [Not [Tied]]] [That knot]] [With One Hand]]]]*

Although we don't speak this way, this is more or less how the brain re-patterns the concepts to discern meaning.

There is such a language which was developed to specifically optimize the transmissions of concepts. It's called *Ithkuil*[112]. In Ithkuil, you can say "On the contrary, I think it may turn out that this rugged mountain range trails off at some point", in the following manner:

Another is *Ygyde*, for example:

CJV CϘA XJC A7A C9J VbXϘA VSC JSObC•

which translates to “Yesterday evening he did not see a green tree”

I doubt we’ll be adopting these any time soon, but they are still fascinating. Given what we know about the parallels between language, neurology, and the nature of growth and evolution, such new languages may provide insight into the creation of patterned information systems (which includes reality), especially with regard to our own neurology.

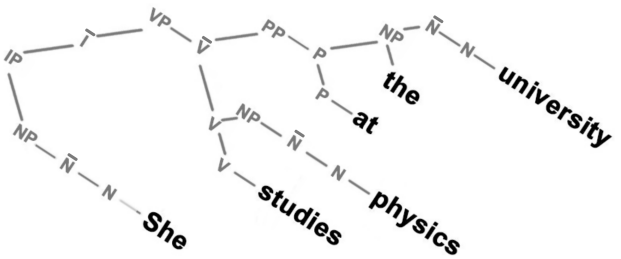
Regardless of the language, they all depend on semantics, which is what makes any language work. Semantics is also a structure that the brain’s wiring can most easily process… which is why language is structured the way it is.

Semantics

Semantics is the branch of linguistics and logic concerned with meaning, but there are two kinds of meaning, according to the *Theory of Meaning* [113]. The first kind is the more common definition of semantics.

> *The description of possible languages or grammars as abstract semantic systems whereby symbols are associated with aspects of the world. (a more objective view)*

An example of this type of objective description might be the following bifurcating graph of a simple sentence.



The second kind is more relevant (to us).

> *The description of the psychological and sociological facts whereby a particular one of these abstract semantic systems is the one used by a person or population. (contextual relevance)*

The *semantic web* is the term used to apply semantic concepts to digital information in an attempt to define what information “is” in a manner that is structured so that computers can read data and know if it is information and, more importantly, why it is information. It does this by creating a relationship between two things.

Take the example of the following sentence:

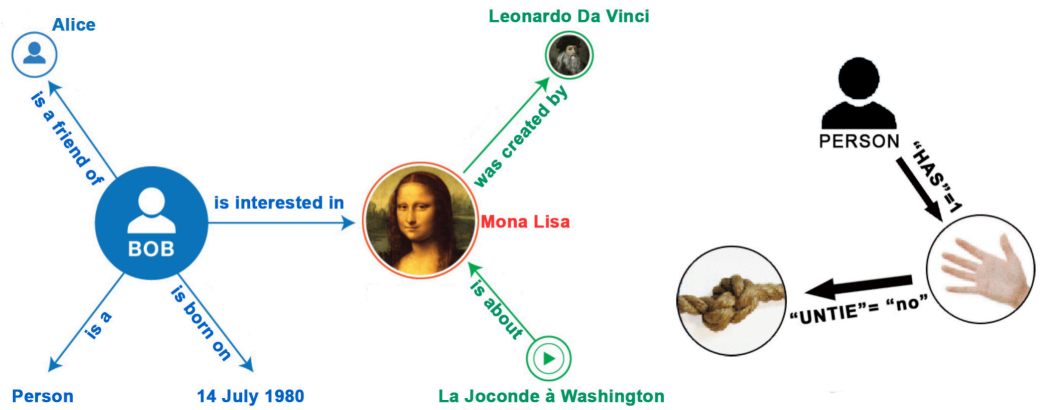
> *"Bob is interested in the Mona Lisa."*

To a human, this is information because we know how to parse this sentence into meaning. That is what learning to speak is all about. To a computer, however, it is just a meaningless collection of 1s and 0s…specifically:

0100001001101111011000100010000001101001011100110010000001101001011011100111010001
1001010111001001100101011100110111010001100101011001000010000001101001011011100010
0000011101000110100001100101001000000100110101101111011011100110000100100000010011
0001101001011100110110000100101110000001010

If we break this sentence up into three parts and define each part in a way that software can understand, then a computer can attempt to find meaning in it. For example, we can tell the computer that we have two *things*, "*Bob*" and "*Mona Lisa*", and one *relationship*, "*is interested in*".

With these three data points, three "atoms" of data, we have the simplest form of information, an information "molecule", so to speak. The "things" are the *objects*, and the "relationship" is the *predicate*. Together they are called a *triplet*. We may have some other triplets about Bob, such as, he is a person, he is a friend of Alice, etc., and we can bind these triplets together quite naturally.



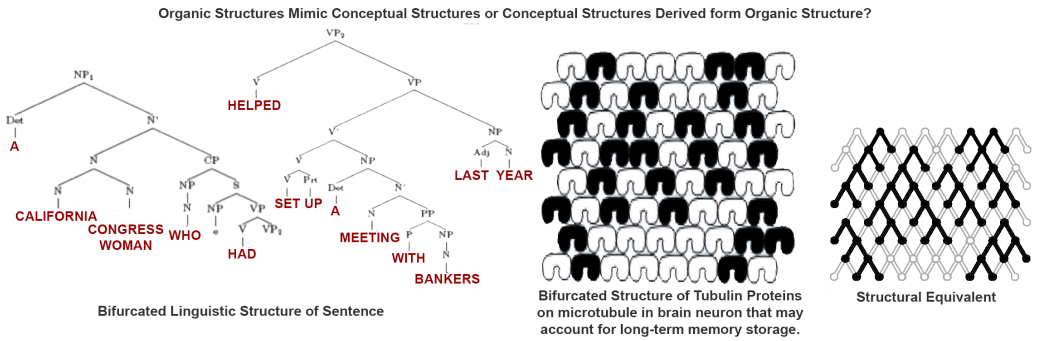
Predicates can be just about anything: "lives in", "has a", "enjoys", etc. Objects, however, are part of a much larger, more structured hierarchies, much like the holarchies described above. Using predicates and objects we can now *graph* our sentence (above right).

How does a computer know what "*is interested in*" or what a "*person*" is? It doesn't "know" the way you or I know, but it does know that a *person* is a type of *agent*, has a *family name*, a *first name* and that a person *knows things*. So, as far as a computer is concerned, a person is just a data-set with a bunch of specific properties and relationships to other data-sets.[114] These definitions and relationships are defined hierarchically into the "that which is" ontology maps.

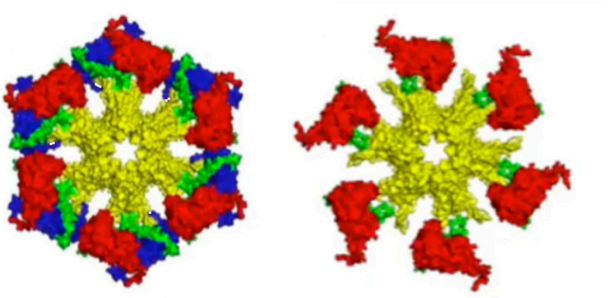
There are thousands of these ontologies of definitions run by corporations, governments, individuals, schools, the military, etc., that cover an incredible array of data in areas of geography, life sciences, linguistics, media, social networking, medicine, catfish, diseases, road-maps, accommodations in Tuscany, etc., and they can all talk to each other by linking *triplets* together.[115]

As you can imagine, a computer can create millions of connections between triplets with little effort and in a very short time. With all these connections, we can ask the computer typical questions like "*How many romantic comedy Hollywood movies are directed by a person who is born in a city that has an average temperature above 15°?*" Of course, social media companies, who have their own ontologies that they aggressively build from their user-base, can ask questions like "*Give me a list of all the boys who are eligible to vote in the next election, and who listen to Seattle grunge bands, are politically left-wing, and have friends and family that are politically progressive.*" More worrying are the queries of the near future, such as "*Tell me all the names of people that are likely to commit a crime in the next week.*" That may sound like paranoia about a dystopian future, but AI systems in China have an 80% success rate in predicting who is a criminal just by looking at them. At Stanford University they have developed an AI system that has a 91% accuracy rate of determining if someone is gay or straight[116], and that is just the beginning.

Language is based on rules of nature and can be deconstructed into triplets, and we can see these same rules applied to both the physiology required to support language, and the language itself. In fact, Stuart Hameroff, the American doctor and professor at the University of Arizona known for his studies relating consciousness and quantum mechanics, has directly mapped the formation of sentences onto the relationships of microtubules via *tubulin proteins*.



It is also quite fascinating, though not surprising, that this information encoding is the result of the bifurcated tree structure of tubulin proteins interacting with hexagonal structures called *Ca2+/calmodulin-dependent protein kinase II*, or *CaMKII*. The significance of binary trees and hexagonal structures will become increasingly apparent as we go deeper into the mechanics of awareness.



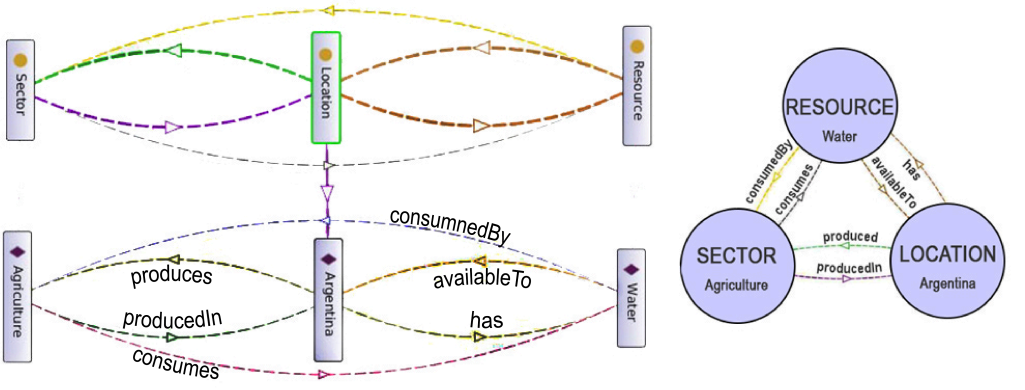
CaMKII

Supply Chain

Here is another real-world example of a current project that is being developed with economists, world leaders, and investors, that attempts to model the supply chain in a holistic manner in order to show how environmentally sustainable solutions can be more profitable than unsustainable solutions over the long term, and how small details along the chain can have global consequences.

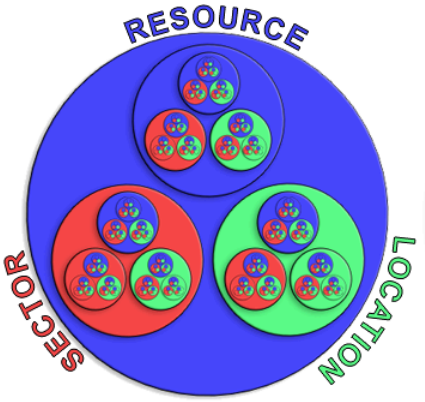
The project started out with reams of data from every sector of the economy, every mode of transport and delivery, distribution, allocations, etc. It was little more than a random pile of data in the form of spreadsheets, various databases, government and industry reports. The researchers sifted through this data looking for patterns, relationships, and dependencies. What eventually emerged were sets of conceptual "triplets" with their corresponding instances and the relationships and rules that existed between them. The researchers had no knowledge of holarchies, yet what they developed was quite similar.

Here are some (somewhat simplified) graphs taken from this project that describes the relationship between *resources*, *location*, and *sector* using the instances of *water*, *Argentina*, and *agriculture*.

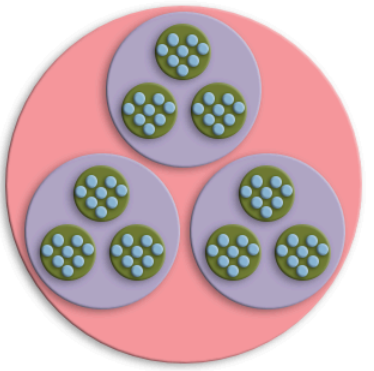


When modeling all elements of the supply chain, they ended up with the following visual representation of the model, with each color representing one of the three concepts that define each context or level (image below). The left image shows the set of three circles that represent *resources* ↔ *location* ↔ *sector* level, with a real-world

data-set of *water* ↔ *Argentina* ↔ *agriculture*. Within one of the inner circles, such as *agriculture*, is information about *product* ↔ *production* ↔ *transport*, such as *tomatoes* ↔ *kilos/yr* ↔ *import/export*. In the end, they were able to calculate the environmental, economic, and social impact that one potato had at every stage of its journey from a spud on an Argentine farm to the garbage bin at a restaurant in Paris. It is not a coincidence that this structure is identical to the structure of the neural wiring that connects a *synapse*, or transmission point, to a *dendrite*, a reception point, in the brain.



Self-similar model of supply chain interdependency



Cross-secion of neural brain axon showing three triplets of microtubules

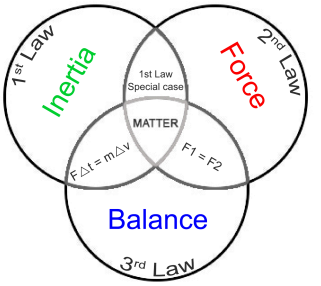
You can clearly see the triplet and holarchic design of this representation of the supply chain in the image above (left). This would be expected if you considered a supply chain as a large-scale version of a living system. The image on the right seems to confirm this, or at least suggest that the brain and the central nervous system is an organic living instance of a real-time supply chain of three levels of embedded interdependency.

Law of Laws

Earlier, we used Newton's 2nd law of motion as an example to show how one law has many contexts, but Newton's 2nd is only one of the three laws of *Newton's laws of Motion*. These Laws are:

1. Every object in a state of uniform motion will remain in that state of motion unless an external force acts on it.
2. Force equals mass times acceleration.
3. For every action there is an equal and opposite reaction.

These are not simply three isolated laws, but rather three attributes of a greater phenomenon that describes all matter.



(Later we show why these laws should be in the order of #3 first, followed by #1 and then #2).

While Newton discovered these laws of physics in 1666, the principles behind them were well established as least as far back as 1494 when the Venetian magician, mathematician and, monk, Luca Pacioli invented double entry accounting, which is still the most common form of accounting used to this day.

How are they the same principles?

Pacioli's underlying principle to his accounting system evolved from his metaphysical and cosmological view that everything comes from nothing, and reality is simply an imbalance of that nothing, therefore, the sum of all things must equal nothing. To apply this to accounting, wherever there is a negative entry there must also be an equal and opposite positive entry. A $10 reduction in the "petty cash" account due to the purchase of paperclips automatically creates a $10 increase in the value of "office supplies" account. Totaling the sums of all the different accounts must therefore equal 0, otherwise the account is not balanced.

In other words: **For every transaction there is an equal and opposite transaction.**

That works for the *balance* part of the 3 laws, but what of *inertia* and *force*? Is *inertia* equivalent to cash-flow? Is *entropy* equivalent to depreciation or amortization? Is *force* equivalent to income or revenue? Playing around with applying Newton's laws to finance is complicated, given the countless ways value is used and defined, but some of the results look very interesting.

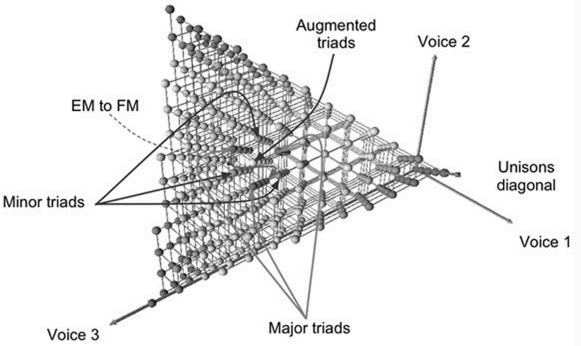
There is no doubt that Newton was quite aware of Pacioli's work, and given both were students of the mystical and arcane, they probably shared many of the same beliefs, so it is probably safe to say that Pacioli's ideas had some effect on Newton's theories. How much, we can only speculate.

We can see this trinity of concepts in any structured system. Here are some examples:

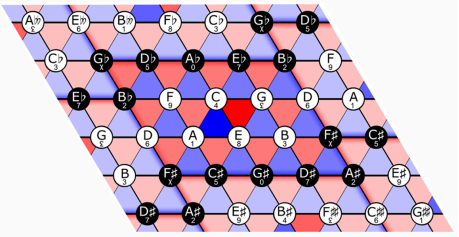
Music

The relationship of music to trigrams is so profound that it deserves a book unto itself, and many have been written, so I will only share that entire theories of music are modeled on the trigram, such as the *Tonnetz* (German for *tone-network*) model,

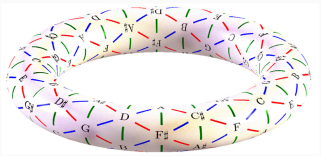
which is a conceptual lattice diagram representing tonal space first described by Swiss mathematician, physicist, astronomer, geographer, logician and engineer, and one of the greatest thinkers of modern history, Leonhard Euler, in 1739. Modern music theorists take it a step further; that of a 2-dimensional map of trigrams mapped to a spinning torus… wow! *Note: This model of music is also referenced in chapter 12, "Predeterminism".*



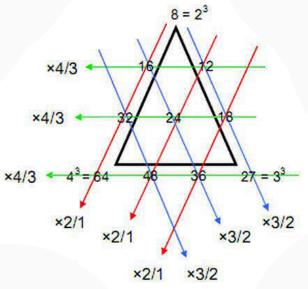
Dmitri Tymoczko "A Geometry of Music"



The Riemannian Music Theory Tonnetz map



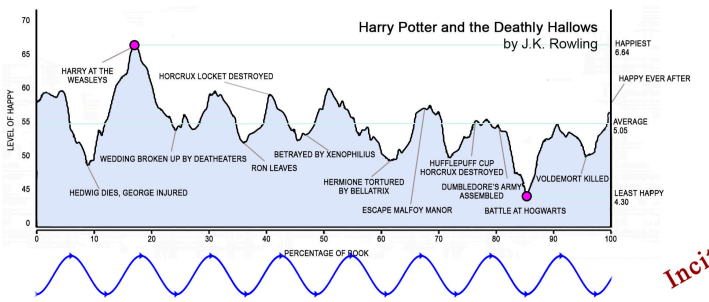
Torrentz map (a.k.a. 2D tholon map) on a spinning torus

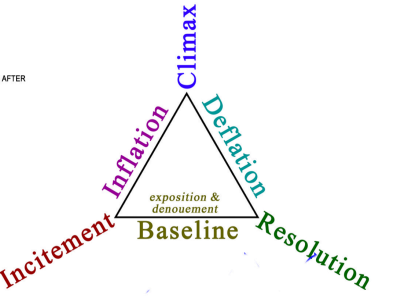


Drama

Around 335 B.C., Aristotle described the dramatic structure of a story as having a beginning, a middle, and an end. Eight hundred years later, the Roman grammarian Aelius Donatus expanded that to a three-part structure of the *protasis (introduction)*, *epitasis (main action)*, and *catastrophe (resolution - which, in those days, was inevitably catastrophic)*. Finally, German playwright and novelist Gustav Freytag turned the three-part structure into a five-part structure with the *Freytag Pyramid*.

The Freytag Pyramid can easily be defined as a trigram (below right) showing the five-part structure of *incitement*, *rising actions (inflation)*, *climax*, *falling action (deflation)*, and *resolution*. Leading up to these five parts is *exposition*, which describes the baseline of the story, the characters, set and setting, etc. After the five parts, there is the *denouement*, or the returning to the baseline of the natural order. It is easy to see how the Freytag Pyramid is the classic three-part structure of *incitement (beginning)*, *climax (middle)*, and *resolution (end)* with the additional dynamics of *inflation* and *deflation*. While it is called a five-part structure, there is obviously the sixth part, that of the baseline, the condition before and after the action described by the five parts.





This, like all info-trigrams, is self-similar, with the *ascending* and *descending* elements being more “atomic”, and the trigrams being more “molecular”. The substance of a story is typically made of many “molecules”. While there may be many types of Freytag contexts, most stories are one of, or a mixture of, the following 6. The image above shows this in an analysis of “Harry Potter and the Deathly Hallows”, by J. K. Rowling.

- **Ascending**: “Rags to riches”
- **Descending**: “Riches to rags”
- **Descending → Ascending**: “Man in a hole”
- **Ascending → Descending**: “Icarus”
- **Ascending → Descending → Ascending**: “Cinderella”
- **Descending → Ascending → Descending**: “Oedipus”

Reduction

The overarching idea here is that every model can be described by a self-similar set of three axis. This is not arbitrary, as we claim that any system can be reduced to, and described by, a collection of *information primitives* (triplets or trigrams). From these essentially 2-dimensional *information primitives* (in that they can be described with only three points) we can build *knowledge primitives* that are tetrahedral in concept.

Furthermore, we hope to demonstrate that these three axis are essentially three different perspectives of one state. An example of this is how energy (as electricity) is expressed in the context and scope of subatomic particles as three different properties of volts, ohms, and amps, forming a trigram, which are them capable of describing a 4th property of *power*, which then forms a tetrahedron. We go even further and claim that the 3+1 dimensions of our reality (X,Y, Z, + time), is itself the most fundamental expression of this same model.

We will return to more in-depth examples after some exploration into these concepts.

Info-atoms

If our premise is that the smallest element of knowledge must conform to the same laws as the smallest elements of form, conceptually speaking, then we need to show how these 2D models, such as the holarchy, fit into a not just a 3D model, but specifically tetrahedral structures that represent “knowledge molecules” with an ordered self-similar hierarchy where each holon is represented as a tetrahedron of information.

Our revised model of hierarchical tetrahedrons will surely look and act differently than a holarchy. To avoid confusion, we’ll refer to these *tetrahedron holons* as *tholons* (for obvious reasons), and the holarchy of tholons as the *thologram*.

Key 62: Every tholon is an archetype.

We are working from the premise that everything that exists is a product of a stable pattern existing between different states. The simplest concept of such a duality is that of *something* and *nothing*. Not much can be said about *nothing*, but as for *something,* we don’t need to imagine something that represents everything at once, which is not only beyond our ability, but as everything has yet to come into existence (or if it has, it has not yet come into our context), it is impossible. On the contrary, we only need to imagine the simplest form of something, for example, a singular dot. A simple dot on a blank page is a diagram of the model on which this reality, and all knowledge, is based. This single dot is often called the *singularity*. In the cosmological sense, the singularity is

> *The point in which all physical laws are indistinguishable from one another, where space and time are no longer interrelated realities, but merge indistinguishably and cease to have any independent meaning.*

These singularities were predicted by Relativity and theoretically have **zero volume** and **infinite density** (and therefore infinite gravity), and was the source of the Big Bang. It was this crazy idea that led to the discovery of black holes.

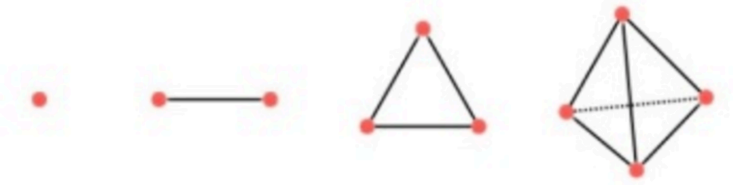
There is another significance to the concept of singularity, and that is the *technological singularity*. This is the point in time when technological growth becomes uncontrollable and irreversible, i.e., technology has the ability to design and build itself, creating an exponential curve of advancement that results in a super-intelligence. Ray Kurzweil, Google’s Director of Engineering, predicts this moment will happen in 2045.

For our purposes, we only need to consider that the singularity that created this Universe is a 0-dimensional dot. This simplest of concepts can explain the holarchy, tetrahedrons, magic crystals, all the laws of physics and every form of intelligence in existence.

Geometry I

The most effective way to describe this process of emergence from a dot to everything in existence is with the language of geometry.

> *Philosophy [nature] is written in that great book whichever is before our eyes – I mean the Universe – but we cannot understand it if we do not first learn the language and grasp the symbols in which it is written. The book is written in mathematical language, and the symbols are triangles, circles, and other geometrical figures, without whose help it is impossible to comprehend a single word of it; without which one wanders in vain through a dark labyrinth.* ***~Galileo Galilee, 1564-1642***
>
> *It is the glory of geometry that from so few principles, fetched from without, it is able to accomplish so much.* ***~Sir Isaac Newton***
>
> *Tao generates the One. The One generates the Two. The Two generates the Three. The Three generates all things.* ***~Lao Tzu, Dao De Ching***



We are taught that the progression from point to tetrahedron follows a very clear and simple path of *point → line → trigram → tetrahedron*.

From the tholonic perspective, this is a very incomplete description because it considers any point to be just like any other point, but they are not the same, as each point has very different attributes. If we ignore those attributes, we are blind to what geometry can show us about so much more than shapes. Order is the most significant difference between these points, which is described below.

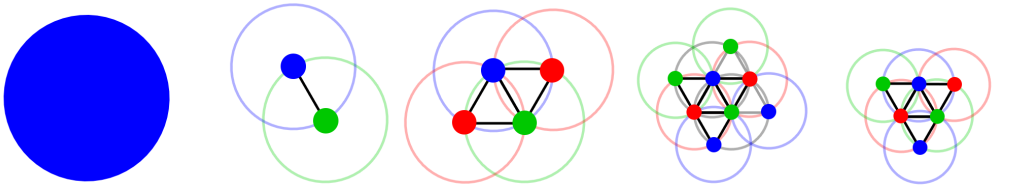
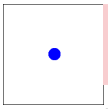
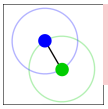


Fig.c1 *Generation 0*	*Fig.c2* *Generation 1*	*Fig.c3* *Generation 2*	*Fig.c4* *Generation 3*	*Fig.c6* *Tetrahedron Only*
1 Dot 0 Dimensions	2 Dots 1 Dimension 1 Line	4 Dots 2 Dimensions 5 Relations	8 Dots 3 Dimensions 13 Relations 6 Trigrams 1 Tehrahedron	6 Dots 3 Dimensions 9 Relations 4 Trigrams 1 Tetrahedron

(Unfortunately, if you are reading this on a black and white eBook reader, these color patterns are meaningless. See Appendix A, "About This Book" to test the gray scale of the primary colors on your e-reader.)



We start with a 0-dimensional dot represented by a blue dot in the middle of nothing ***(Fig. c1)***. Because it is 0 dimensions and surrounded by nothing, it only exists as a concept. It has no form, no dimensions, no properties other than that it is a *concept* of a point that exists. But where does it exist? It can't be measured, seen, or interacted with in any way, so how can we say it even exists? We can only say it exists because of the awareness of its existence. The only difference between a void of nothingness and a void of nothingness with an imaginary point in it is the *idea* of an imaginary point in a void of nothingness. Without the awareness of its existence, the void of nothingness would simply remain a void of nothingness. This is our first duality, that of *nothingness* and the concept of *somethingness*, and also the first condition of imbalance.



This next step requires some philosophical conjecture because we have to ask why/how does a 2nd (green), dot appear (***Fig. c2***).

If we accept the premise that everything that is created has the attributes of, and limitations of, whatever created it, then, the answer is clear and simple. As this lone imaginary dot in the middle of infinite nothingness only exists as an awareness of the concept of a point in the middle of infinite nothingness, the one attribute this point *can* have is awareness, as that is what it was created from. And what was this awareness? We can only presume that it was the most fundamental form of awareness, that being the awareness of existing (which is not the same as the meta-awareness of being aware that one is aware). Additionally, being the only awareness that exists, it is virtually *unlimited awareness*, and possibly *infinite awareness* as well if we consider "infinite" to mean the totality of all.

There is one more, far less obvious attribute to consider as well, and that is *intention*, because the awareness that conceived of a point in nothingness had to have the intention to conceive of it. So, our point in the middle of infinite nothingness has two attributes; Awareness and Intention. The nature of that intention is addressed further on.

Key 63: Awareness and Intention (A&I) is the source of existence.

We see this same concept, that of creation being the result of A&I, in the spiritual texts of every major belief system. For example, in the Abrahamic (Jewish, Christian, and Islamic) lore [117], when God spoke to Moses, God was quite specific about its name and not only told Moses its name was "I Am (Who/Which/That) I Am" (אהיה אשר אהיה) but also informed Moses that the voice he was hearing was (or was sent by) "I AM" (יהוה).

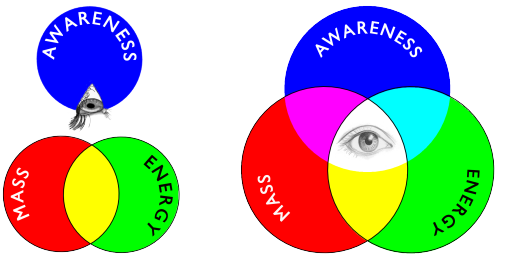
The phrase "I Am" is especially relevant to the fundamental forms of Awareness and Intention as "I" is the simplest concept of Awareness that can be communicated. The infinitive verb of "to be" is a statement of intention, with its present tense form being "Am". Quiet literally, "I Am" means "Awareness and Intention".

Key 63: "I Am" literally means the present form of "Awareness and Intention".

Buddhists appear to have cut out the middle-man (or perhaps "middle-god") as they do not have the concept of a divine being, but they do have the concept of a primal "I Am" awareness, as suggested in the Buddhist proverb: *A person asked Buddha: Are you a God? Buddha's reply was No. Are you an Angel? No. Then what are you? I am awake.*

We can also see the concepts of A&I in the context of physics. Take the example of energy, mass, and light, as we briefly addressed earlier. Light has no mass, and without movement, it also has no energy and only exists as the concept of a 0-dimensionless point. Without movement there would be nothing to measure nor would it interact with anything. This conceptual point, a result of *awareness*, only has properties when it moves (speed, frequency, amplitude), and this movement is an expression of *intention*, making light (or any form of radiation) a primal expression of A&I. It also suggests that awareness may be the purest form of energy, but it is intention that makes it manifest through movement. Awareness and Intention, being the only two properties of this non-existent dot, always exist as two aspects of the primal dot, and therefore always exist together, similar to an electromagnetic field in how the magnetic field can only exist if there is movement of charges (intention), while the electric field surrounds the charge whether moving or stationary (awareness).

This may sound like we're teetering on the edge of mysticism, but this is not our goal. We simply are following the most reasonable path that our ability to understand our reality allows. The fact that it suggests that all of existence is a form of A&I is not mysticism, it is a hypothesis of reality. Science is slowly beginning to consider that there might be a relationship between awareness and reality, but the tholonic position is that awareness is not only the fabric of reality, but that the intention of that awareness is the energy that drives all of creation and the only energy in existence. Just as the term "electrical current" implies a magnetic component, the word "awareness", as we use it here, implies an *intention* component, as Awareness and Intention always coexist. In the reality we exist in, there is no Awareness without Intention, nor Intention without Awareness.



Current Model of Reality

Tholonic Model of Reality

We have seen how mass is a form of energy, and how they both follow the same rules applicable to their context. Because of this, we can speculate that mass and energy are two different instances of the same archetype of pure energy but instantiated within two different scopes or contexts. We will take one step further and say that awareness itself is an instance of that same archetype but in an even "finer" context, i.e. before there was mass, there was energy, and before there was energy there was A&I. Were this the case, it would shed light on why and how awareness and intention is an integral part of reality, which could provide answers to the quantum mystery of how and why awareness itself is required for reality to exist. We accept that reality is a result of the interaction between the 2 states of mass and energy, but what if there are 3 states; energy, mass, radiation, and awareness?

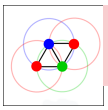
It would be very convenient if awareness/intention was somehow mapable to one of the missing formulas in our hexagonal model of Newton's 2nd, because then we could see that mass, energy, and force were connected to awareness/intention, suggesting that nothing can come into existence without awareness/intention. We might then also be able to calculate the *field* and *force* of awareness. To be clear, I am not claiming this is the case, just that it would be convenient if it was.

So, our first dot has the two attributes of A&I, and the limitation of 0-dimensions. This dot, then, is itself a form of awareness and intention, and being so, there is now an awareness of *dotness*, not *its dotness*, just *dotness*, as that is all there is to be aware of, but it is an awareness of *dotness* with intention. Just as the first dot is the effect of intentional awareness, that same intentional awareness in the newly created (blue) dot will be the cause of a new effect, a new conceptual (green) dot. Perhaps this is what Nietzsche was referring to when he wrote in "Beyond Good and Evil":

> *And if thou gaze long into an abyss, the abyss will also gaze into thee.*

The new dot, and all dots that will ever come into being, have the same qualities of awareness and intention, as that is what created it, so as soon as the first dot was created, a never-ending cause-effect chain reaction of dots creating dots was initiated, like a kind of conceptual Big Bang. With these first 2 conceptual, 0-dimensional dots, the first relationship was created… the line.

There are now 2 states of *dotness*, *this* A&I and *that* A&I. This is the birth of the concepts "I" vs. "Other than I", and "Me" vs. "You". Where before there could only exist unlimited A&I as there was nothing other than *dotness*, now there is A&I that is limited by, and defined by, A&I. This results in 2 types of awareness; the *subjective*, which is the A&I of one's existence, and which is infinite by nature, and the *objective*, the A&I of another's existence, which is finite by nature. The existence of 2 dots creates the 2 instances of A&I, that which is infinite, and that which is finite. Both of these states exist in each dot, so now there are 2 instances in 2 dots. In this way, 1 dot creates 4 perspectives (remember this, as it will soon be a very significant detail).



With the existence of another A&I, each dot now has a center of *its* A&I, with the *other* dot defining the limits of its A&I. Where before there could only exist unlimited A&I as there was nothing other than *dotness*, now there is A&I that is limited by, and defined by, A&I. Where these 2 instances of A&I meet, where *subjective* meets *objective*, where the *infinite* meets the *finite*, creates a pair of new (red) dots (***Fig. c3***), 2 new instances of A&I, each created from the merging of these polar opposites.

At this stage we have all 3 types of dots; blue, green and red. Each of these dots came into being due to a unique cause and each had a unique effect.

- The 1st blue dot represents the initial or parent 0-dimensional dot that has no ability to create dimension and exists only as a concept of awareness. This is the awareness that exists before self-awareness, as self-awareness can only exist when there is something other than itself to be aware of. Self-awareness

requires an “other” awareness, a duality of awareness. This is the dot that defines the simplest form of existence as pure A&I. It is equivalent to the number 0 as it is the concept of nothing.

- The 2nd green dot represents the first-generation dot created by the blue dot. This dot can add 1 dimension to 0-dimensions and defines separation and division, creating the conditions of subjective and objective, and consequently the idea of self-awareness as a result of a state of awareness/intention with respect to another state of awareness/intention. This is equivalent to the number 1, and by extension, all real numbers.

- The 3rd red dot represents where the blue dot and the green dot interact. The 3rd dot is always created as a pair, one for each of the opposite states of blue dot-green dot interactions. This dot can add 1 dimension to an existing 1-dimensional space and defines the concept of *scope* and *area* as a result of the *union*. This is equivalent to 2-dimensional numbers, or complex numbers, such as $i = \sqrt{-1}$. Why is it related to imaginary numbers? Because we have two real numbers, 0 and 1, that create two versions of a 3rd number, as represented by the 2 red dots. This 3rd number therefore needs two values to be fully expressed, which is also the case with any real number multiplied by an imaginary number, as in $2 \times \sqrt{-1} = \mathbf{2i}$, (This might also be an argument why the blue dot’s value should be *i* rather than 0, making the 3rd dot value $1 \times \sqrt{-1} = \mathbf{1i}$).

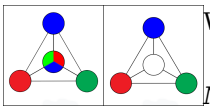
Our ever-expanding conceptual model, however, is imprisoned in the 2D world forever because even though it can make an infinite number of dots in the 2D plane, it cannot make a new dot that expands itself into the 3D plane. Why can’t the same process that was used to create 2D from 1D be used to create 3D from 2D, by just creating another dot with another dimension?

The reason is as follows: There can only be 3 types of dots in the 2D world because that is the minimum number of dots required to define an area. If we added a new 4th type of dot that was also constrained to the 2D world, whatever area it creates could be defined using 3 dots just as well, so, this 4th dot adds no new or unique information and is useless. We need a completely new type of dot that is compatible with all 3 types of dots.

Not surprisingly, the trigrams have already given us the answer with the following two clues. The 1st clue is that the creation of one trigram implies the creation of three additional trigrams, each one connected to each side of the center trigram. The 2nd clue is that for each of these new trigrams another dot is created. These 3 additional dots at the outer tip of the new trigrams are each of a different color. As every trigram must be composed of 3 unique dots (R, G, and B), and as a new type of dot capable of creating a 3D tetrahedron from the trigrams would automatically create 3 new

trigrams, whatever dot type this new dot is, it would have to act as a red dot to the blue-green pair of the original trigram, a blue dot to the green-red pair, and a green dot to the red-blue pair.

The RGB dot , or what we'll refer to as the *white dot* , represents the combination of all three primary dots. This dot can add 1 dimension to 2-dimensions and defines volume as a result of the union of the 3 unique trigrams that extend from the center trigram. Such a dot is created when the 3 outer trigrams fold until their points meet. The folding occurs naturally because it represents the most balanced and efficient interaction between a set of four unique dots (R, G, B, W), and as energy will always travel the path of least resistance, thanks to entropy, folding would naturally occur as would the creation of a new dot.

 We now have a tetrahedron.

Note: This same concept is also explained in a mathematical manner in the chapter "How Creation Works" in the book "The Tholonic I-Ching", which examines the I-Ching from a tholonic perspective.

Technical note: The colors RGB were chosen to best demonstrate how the dots interact, and these colors are used to represent the properties of these dots throughout the book. However, the more informative approach would be to have the 1st dot as blue, the 2nd dot as red, and the 3rd dot as yellow. This is because the intersection of the blue and green radii combine to create yellow. The practical problem with that is with each generation, new and unique colors are created, and I suspect that using this model would result in all colors being generated. While this may be an excellent example of using colors as a visual representation, it fails miserably to show basic patterns, and attempts to do just that were a nightmare to manage.

Holons to Tholons

Let's back up and apply some of the semantic concepts to the holarchy as it will shed more light on the nature of information and how a holarchy forms a network of trinities in the way these holons interact with one another.

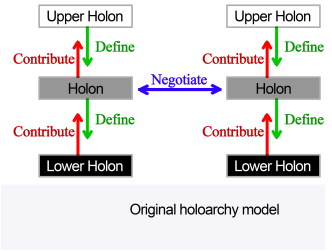
We begin with a simple trigram.

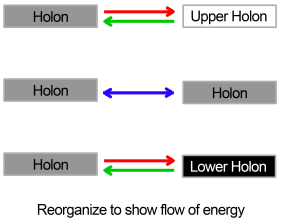
According to the creators of the holarchy model, each holon has three functions:

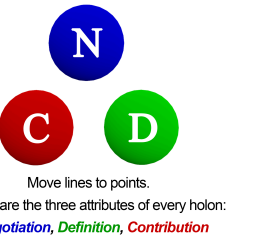
- **Contributes** (to the context it exists within)
- **Negotiates** (with other peer contexts)
- **Defines** (that which it provides context for, its creations)

These attributes hold up quite well when compared to our real-world example of a supply chain, as there is a contributing supply, a demanding market for that supply, and the negotiations, cooperation, and competition that connect the two.

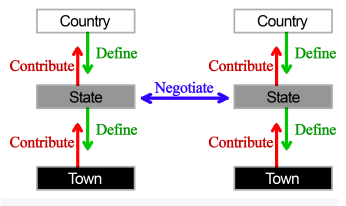
Here is where we turn a holon into a tholon… by rearranging the order, while keeping all the relationships the same, and them presenting that order in a different format.

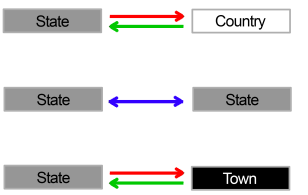


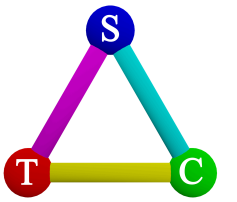




This is much more that a cosmetic change, for by changing the focus and the pattern we can see a lot more information. For example, we naturally want to imagine how to connect these three attributes. If we create connecting lines (demonstrated below) that are the colors of the point that create them, we get one perspective, and if we use colors that are the colors opposite the line, we get another perspective. The more tholonic choice is to use the complementary colors, for a number of reasons, but the main reason is because this options creates complimentary or pairs, or pairs of opposites, and nature, reality, and existence are all based on opposing forces.



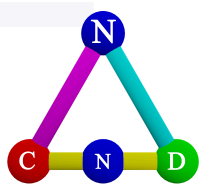




There is still a piece missing. If we apply the holarchic model to the archetype concepts of *town*, *state*, and *country*, the model shows the interactions between *state*/*country* and *town*/*state*, but shows no direction connection between *town*/*country*. The tholonic model *does* show a direct connection (yellow line), however, if the concept of *state* is stable, then a new *state* will naturally appear across this connection simply because it can, and if it *can*, it *must*. For example, the three towns (i.e. colonies) that existed near the Delaware Bay in the newly declared United States of America eventually became the State of Delaware, and the first state in the United States.

The tholonic model therefore creates a new instance of *state*, which means there are now two instances of *state*. It may seem redundant to have two instances of *state*, but in fact, they are not the same. The originating concept of *state* is that of any social structure that exists between *country* and *town*, but a *state* that exists between *town* and *country* is specific to that *town* and *country*. For example, the abstract concepts of *town*, *state*, and *country* may instantiate as *Woodstock, New York, USA*, or *Navarro, Buenos Aires, Argentina*, two radically different instances of the same *town/state/country* tholonic archetype. But this is not the most important difference between these two *states*. As described earlier, the blue/*Negotiated* point is the only point from which children can emerge, therefore, a new negotiated point must exist for there to be any instances. That point, in this example, is the negotiated balance between *town* and *country*. Specifically, a *state* is *Defined* (limited, constrained) by its *country* and *Contributes* (allows for creation of) its *towns*. So, this new point of *state* between *town* and *country* would be a instance of the concept of a *state*, for example,

the *state* of *California*. Now, *California* is itself a concept that has within it it's own California-based instances of economy, politics, culture, terrain, weather, etc. Hence, the final model of a 2-dimensional tholon is:



Stress on 2-dimensional, as the 3-dimensional model is far more complex, which we get into later.

Buffalo buffalo Buffalo buffalo buffalo buffalo Buffalo buffalo

Before we continue, we have to clarify some points on vocabulary. Words can be confusing, and sentences even more so. Take the grammatically correct sentence above which was invented by professor William J. Rapaport in 1972 to demonstrate the point:

What this sentence is trying to say is:

> *Bison from Buffalo, New York who are intimidated by other bison in their community also happen to intimidate other bison in their community.*

The confusion comes from the fact that the word *buffalo* has a number of meanings: as an animal, a place in New York, and a synonym for bullying.

In the English language there are concepts of the *progressive form* of a verb to indicate ongoing action, a *perfect form* to indicate a completed action, and a *perfect progressive form* to indicate the transition between *progressive* and *perfect* (i.e., ongoing action that will be completed at some definite point). All these forms also have *past*, *present* and *future* tenses as well. Can *perfect* verbs also be nouns? Yes, sorta, in some cases, as in the word *balance*. While *balance* as a noun is defined as "A state of equilibrium", that definition also applies to the *perfect* form of *balance* as a verb. This is not the case with words like *run* or *drive*, as there is no *present* state to achieve, no final condition that driving or running results in, only a *past* state of *ran* or *drove*. In some cases, like in the word "perfect", when pronounced *PER-fect* it is a noun, and when pronounced *per-FECT* it's a verb! So let's be very clear on how we are defining the word *negotiate*.

First, understand that in this hierarchy of energy, everything is happening all the time, so when we refer to these energies we refer to them in the present (unless otherwise noted).

Negotiate: This is the infinitive version of the word, and when used alone can refer to any tense or form of the concept depending on context; *negotiate*, *negotiates*, *negotiating*, *negotiated*, *negotiable*, etc.

Negotiated: This is a noun, and specifically refers to the **sustainable balanced** arrived at through *negotiation*.

Negotiating: This is a verb, and refers to the interaction of the various forces at play which are interacting with each other in the process of establishing at **sustainable balance**, or *negotiated* state.

The Thologram

The primary reason why the properties of movement and energy are the key points in a thologram rather than the instantiated elements, as in the holarchy, is because it is the properties of movement and energy that are consistent at every level of creation. There may be millions of instances of different types of elements within the holarchy, from subatomic elements to universal elements, and everything in between, but the properties of movement and energy are always the same, even though they are expressed differently for each context. Therefore, it is the properties of movement and energy that define the structure of the hierarchy, not the instances of elements.

To further illustrate this point, we can use the previous semantic example of "Alice *is a friend of* Bob". The tholonic model looks at "*is a friend of*" as the energetic force that defines Alice and Bob, at least within this narrow context of *friendship*. Without relationships Alice and Bob would not even exist, as relationships define every interaction at every level of existence.

Consider the triplet *Bob is a farmer that grows corn and eats meat*. We can look at the relationship of the three objects (nouns) *Bob, corn, meat*, which would be relevant to Bob, or we can look at the relationship of the three predicates (verbs) *is a, grows, eats*, which applies to all autotrophs (animals that grow their own food, like Leaf Cutter and Fijian ants, damselfish, yeti crabs, and humans).

These properties direct energy, energy has movement, and movement has direction. In this example, the direction is clear, however, this direction could change under different circumstances as we'll see later on.

The idea of modeling reality on the movement of energy rather that the *things* themselves is not a new idea. The *Reciprocal System theory* is built on the same premise and provides the best explanation of why we are using the movement of energy in the relationships and not the contexts of where that energy is coming from or going to.

> *The thesis of the Reciprocal System, however, is that the Universe is not a Universe of matter, but a Universe of motion, one in which the basic reality is motion, and all entities - photons, particles, atoms, fields, forces, and all forms of energy - are merely manifestations of motion.* [118]

Like every theory, it has its fans, but also its critics. In any case, it applies perfectly here.

Newton's laws of Motion are similar in this regard, as the laws of motion describe the energy that relates to mass, not any particular instance of mass. Because of this, we can show a direct relationship between these tholonic concepts and Newton's laws:

- **Newton's 1st law states** *"Every object in a state of uniform motion will remain in that state of motion unless an external force acts on it".*

  This law introduces the concept of an instance of mass, putting it in the realm of the 2nd green dot, and its limitations. Its inability to move or change without an external forcing acting upon it puts it in the tholonic realm of *Definition*. The concept of *inertia* is defined here, being the restrictions on mass.

- **Newton's 2nd law states** *"Force equals mass times acceleration".*

  Force is the result of time and space (acceleration and mass), so it is within the realm of the 3rd red dot, scope and area, and tholonically is within the realm of *Contribution*, as it creates a new concept that describes the most fundamental property of energy, that being the *force* of movement.

- **Newton's 3rd law states** "*For every action there is an equal and opposite reaction.*"

  This equates to *balance*. No mass or energy is defined here. This law only describes the result of existing energies acting against each other, associating it with the 1st blue dot realm of *Negotiation*. The concept of *balance* (which includes the concept of imbalance) is born of energies interacting with one another.

The order of the laws assigned by Newton shows the concept of *balancing* (verb) following the concepts of *Definition* (mass, inertia) and *Contribution* (force). In the tholonic model, the *First Cause*, the top of the hierarchy, begins with a stable point of *Negotiated balance* (noun), from which *Definition* and *Contribution* emerge as the result of the movement of energy. For this reason, the tholonic order of Newton's laws would be the following:

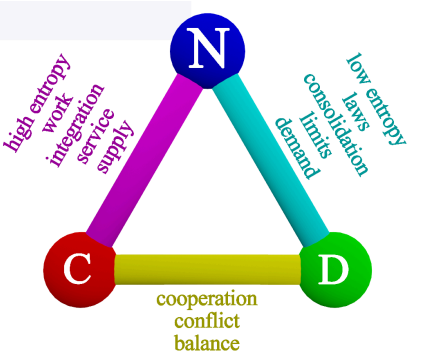
1. *For every action there is an equal and opposite reaction (Balance, Newton's 3rd law)*

2. *Every object in a state of uniform motion will remain in that state of motion unless an external force acts on it. (Inertia, Newton's 1st law)*

3. *Force equals mass times acceleration (Force, Newton's 2nd law)*

Key 64: Relationships define the function and purpose of any instance

Now that we have mapped the three properties of N, D, and C onto a trigram we can see and label a new class of attributes that are the result of these properties interacting with each other. For example, what we would expect to see across the spectrums?

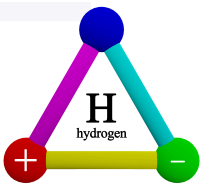


- *Negotiation/Definition*: This is the spectrum of **laws, rules, limits, demand**, as nothing can exist without definitions, limits and rules, either imposed by nature or some other system, such as society. In the context of human interactions (just to keep it simple and clear), this pretty much describes how we agree on laws, rules, and limits. This also applies to the demand side of supply & demand, as the demand for something is the limiting factor with regard to its usability.
- *Definition/Contribution*: This is the spectrum of **cooperation and/or conflict**. Here is where the two opposing concepts, restriction/expansion, low/high entropy, interact with one another. How something is defined and what it instantiates as are two different things, and the path to expressing that definition requires integration with its environment or context, which can be cooperative or competitive.
- *Contribution/Negotiation*: This is the spectrum of **work, enablement, service, supply**. Society as an organism in its own right has certain needs that must be met to survive, and it is the responsibility of its members to address those needs. This is also the supply side of supply and demand, as production is certainly a contributing factor, involves work, provides a service, and enables further growth.

This trigram of relationships are present in every instance of creation and will be expressed according to the context and scope of its instantiation. In the context of society, we have *laws*, *service*, and *cooperation*, and in social theory, such as Adam Smith's *Theory of the Invisible Hand* [119], which is predicated on the idea of cooperation based on voluntary exchange that benefits both parties as well as the society. In another context, such as the atomic world, *laws* would refer to the limits that an atom must exist within. *Cooperation/conflict* could describe how the atom's negative and positive forces work with, and against, each other, or perhaps how atoms fuse (unify, as in nuclear fusion) and "fiss" (break apart, as in nuclear fission). *Dedication* describes the aspects of an atom that enhances the ability or properties of its parent tholon, that being the realm from which it was created, which in the tholonic view would be the realm of subatomic particles, such as electron protons and neutrons. How useful would subatomic particles be is there weren't any atoms?

Key 65: Stable patterns/instances form dynamic relationships/movement of energy which form stable patterns/instances.

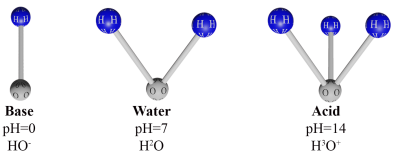
Simple Instance



What would be the simplest instance of this trigram? The most simple would probably be an element that only contains a single positive (*Contribution* or *C*) charge and a single negative (*Definition, Limitation* or *D*) charge, which exactly describes the first instance of matter, hydrogen. What is especially relevant is that it does *not* contain a neutron, which, from the tholonic perspective, it should not as the *Negotiated* state, being a 0-dimensional point, does not actually exist (other than as a concept). Hydrogen with a neutron does exist, and it is called *deuterium*, but the fact that the most basic, fundamental, and abundant element in existence, and the element that all other elements are created from, does not, is certainly supportive of the tholonic model, at least in this case

On the biological level, this describes mitosis and meiosis, the process of cell duplication, or reproduction, where one cell gives rise to two genetically identical daughter cells.

In the realm of philosophy, we have the Hegelian Dialectic of thesis, antithesis, and synthesis. In fact, for a tholonic concept to exist as a potentially viable and sustainable expression it must satisfy a form of the Hegelian Dialectic, in that it must support a thesis (D), antithesis (C), and synthesis (child N) that is a product of C and D.



One obvious instance of this model can be seen in chemistry in the balancing of pH, which is the measure of the electrical charge of hydrogen ions. The more complex the life-form, the more it requires a balanced pH of 7, which is right in the middle of the two extremes of pH 0 (battery acid, negatively charged) and pH 14 (drain cleaner, positively charged). This suggests that a balanced pH allows for more growth options and therefore evolution, and, of course, we know this as water is a pH of 7, and most life depends on it. When combined, acids and alkalies “negotiate” with each other in the form of interactions, competing and cooperating on an atomic level to find a stable negotiated balance, like our previous table salt and water example.

Another instance is in the way genetic traits are combined and passed from the two sides of the tree.

There are countless instances of nature and reality following this most fundamental of all patterns.

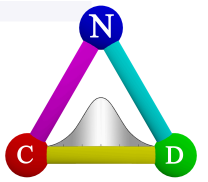
We can speculate a number of things from this trigram, but the one detail that is important before moving on is that the initial 0-dimensional blue dot, or what we will call the *N-point*, is the originating point, and the only point that is able to replicate itself. Why this is so will be explained shortly. We will refer to the blue-dot *N-point* as an *N-state* when it is in a state of negotiation (verb) , or an *N-source* when it is in

a balanced negotiated state (noun), depending on context. An *N-point* can be either an *N-state* or a *N-source*. While an *N-point* is actually both of these it acts as one or the other depending who whether it is acting as a creation of a *holon* (*N-state*) or the progenitor of a *parton* (*N-source*). An *N-state* has a dimensional form and a contextual instance, while an *N-source* is a 0-dimensional concept. This is similar in how a physical printing press is an *N-state*, but the ideas that printing press creates, such as printing a book, is an *N-source*. One that book is printed, it is in an *N-state*, but concepts that stem from that book are *N-sources*, e.g., the Bible or the Communist Manifesto, and hopefully, this book.

House of Mirrors

The tholographic claim is that within the trigram there is energy, and therefore movement, and therefore patterns and oscillations from which stable states will arise that are sustainable enough to form a new N-source that is capable of transferring energy across the scope defined by C and D. Even though one particular state will exist at one specific point on the 1-dimensional spectrum/line between C and D, all possible states will cover the entire range between C and D. We can generally guess where along the line various states will arise by applying a Bell curve to this line.

The image on the right shows a Bell curve within the trigram to show where along the CD spectrum stable instances will most likely occur. Also important to remember is that the (yellow) line opposite the top (blue) N-source is the field of interactions between the C and D creations of the N-source, and where a new N-state will form which will potentially become a new N-source when it become stable enough to generate new patterns of its own.



We can now describe one creative aspect of a tholonic trigram and its properties a bit more clearly (hopefully):

- **N** (negotiation) equates to the 1st blue dot, which is the awareness of a concept in its simplest form.
- **D** (definition) equates to the 2nd green dot, which introduces limitation, division, and separation.
- **C** (contribution) equates to the 3rd red dot, which, with the previous two dots, results in unification and form.

By these descriptions, we can describe a general process that defines creation as something like:

> *The cooperative or conflicted merging of contrasting concepts that finds a balanced (Negotiated) expression in form (Contribution) through limitation, division, and separation (Definition).*

At the most abstract levels, this describes the Big Bang Theory, biological reproduction, the laws of physics, philosophy, and anything else that exists in any sort of duality.

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8: The Thologram

How the tholonic structure is defined

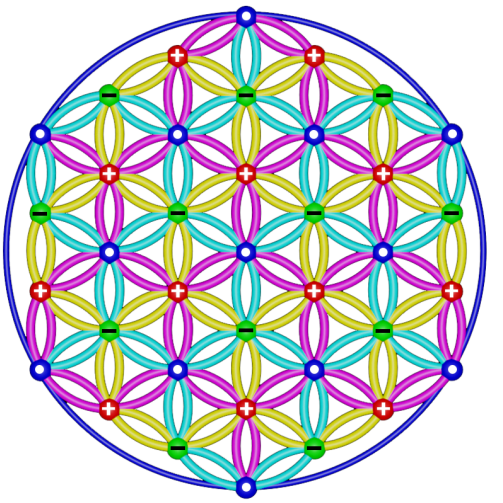
Synopsis: *This chapter contains detailed explanations of how the thologram came into existence from nothingness and the structures of, and within, the thologram with real-world instances. We explain and explore the thologram using geometry, math, colors, fractals, and numbers and apply some ancient and modern concepts to validate the redundancy of the thologram.*

Keywords: *generations, iterations, N-states, entropy, matrices, dimensionality, tholons, virtuality, binary, geometry*

This chapter describes the thologram, how it came into being, and details about its properties. As this book focuses more on the practical and, therefore, somewhat technical aspects of the origins and applications of Awareness and Intention rather than philosophical, metaphysical, or spiritual aspects, some technical content is unavoidable. I have attempted to keep it as simple and brief as possible, but even if you are not a fan of geometry or math or have no interest, it's worth at least a browse.

Inner, not Outer

We have seen how the creation of a single trigram will automatically create additional trigrams as part of the same creative process. This would imply an infinitely expanding realm of trigrams, as previously shown, and again shown in more detail in the image to the right. When limited to 37 points, this pattern is often called the *flower of life*.



Flower of Life pattern overlayed with N, C, and D points of the thologram

The *flower of life* design dates back to 1300 BC, with the oldest known instance carved on the temple walls of the ancient Egyptian temple "Osireion". Again, we see the same concepts and patterns appear over and over again in Man's search for understanding using the power of reason.

The tholonic model sees this expansion a little differently. If we are claiming that the first instance of creation, that of the 1 dot becoming 2, and the 2 becoming 3, etc., even if we are speaking metaphorically, then what we are also claiming is that this first trigram represents the very first polar duality created by the first non-polar duality of somethingness and nothingness. This would imply that every duality and trigram that follows must exist *within* the first trigram, not outside of it. Every succeeding duality can only be a subset of this first duality and certainly cannot exist outside the bounds of somethingness and nothingness.

We see a very different pattern if we draw our expanding trigrams such that the children are always contained *within* the parent.

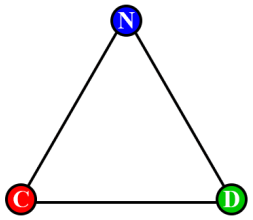


Fig. p1

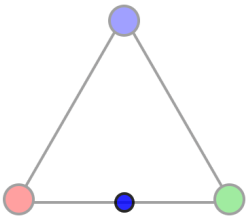


Fig. p2

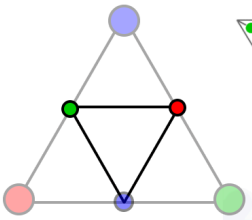


Fig. p3

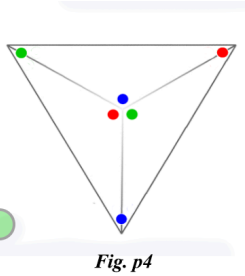


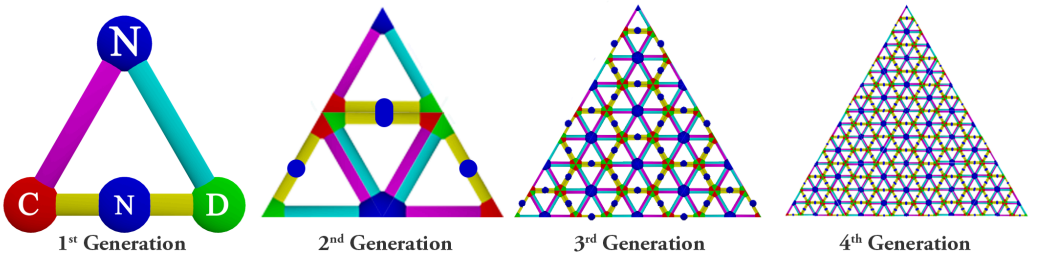
Fig. p4

The NDC points represent the first trigram in this example diagram above (***Fig. p1***). ***Fig. p2*** shows where a child N-State naturally forms along the CD spectrum. ***Fig. p3*** shows the same process as ***Fig. p1***, but as a child of the parent. This *inwards* expansion (***Fig. p3***) of the child N-State naturally terminates precisely at the limits of the parent's boundaries, creating three additional trigrams. ***Fig. p4*** shows the final form as a tetrahedron.

The *flower of life* represents an *external expansion* of the singularity. In the thologram, the singularity creates a trigram which then creates infinite trigrams. It is the expansion *within* that 1st trigram where movement and growth happen, as there is nothing outside that trigram. From the scientific perspective, a singularity is a 0-dimensional point where some property is infinite. In the case of the Universe and the Big Bang that created it, that property is gravity. From the tholonic perspective, that property is Awareness and Intention.

In ***Fig. p1***, the parent trigram, the order of NDC is clockwise, but the same three points of the resulting inner trigram are counter-clockwise. These end points have not been reordered, as the original clockwise NDC is still there in the parent, but the child trigrams represent completely new creations with their own ordering. The reason the children have a different order is because the new generation was spawned by the new N-source between C and D, and as D is always the first to follow N and always on the left of N (left, or *portside*, to be more accurate, is arbitrary, but we need to remain consistent). This newly spawned D will appear on the opposite side of the parent's D, and so for the C as well.

We started with one trigram and one generation, resulting in 4 child trigrams. Each generation of self-similar creation increases the number of trigrams by 4. Here is what the generations look like.



1st Generation
1 1st gen trigram
1 total trigrams

2nd Generation
1 1st gen trigram
4 2nd gen trigrams
5 total trigrams

3rd Generation
1 1st gen trigram
4 2nd gen trigrams
64 3rd gen trigrams
69 total trigrams

4th Generation
1 1st gen trigram
4 2nd gen trigrams
64 3rd gen trigrams
256 4th gen trigrams
325 total trigrams

Note: The progression of children for each generation grows at the rate 4^0, 4^1, 4^3, 4^4, 4^5 ... Notice that 4^2 is skipped over.

While this is the basic idea of the model, it is only half the story. The more complete version is; rather than imagine yellow, cyan, and magenta as lines connecting the points, imagine 3 intermediary points: yellow, magenta, and cyan in-between the red, green, and blue points. This creates a new trigram that starts with a yellow point, then creates a magenta and cyan corner point and their intermediary points of red, green, and blue points.

This is a critical concept, so it's worth a demonstration. We have specifically chosen the RGB/CMY color model because the RGB colors are *additive*, and CMY colors are *subtractive*.

Externally Descending Children

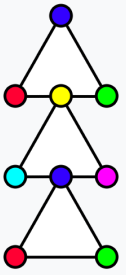


Fig. t1

Internally Descending Children

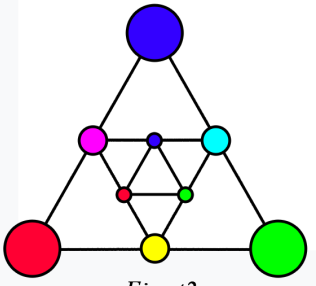


Fig. t2

3 Generations of Children overlapped
(using colored dots rather that colored connecting lines)

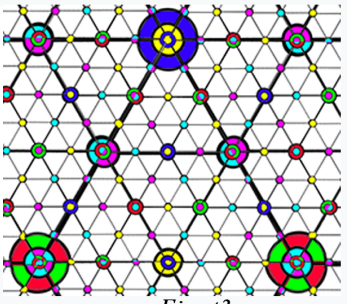
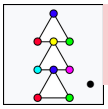


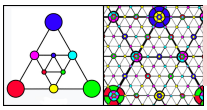
Fig. t3



In the first case (***Fig. t1***)...

- Blue spawns green
- Green spawns red.
- Green and red (additively) create a new yellow.
- Yellow spawns a mixture of each of its component colors (red and green) with its parent color, blue, making cyan (created by blue and green) and magenta (created by blue and red).
- Magenta and cyan (subtractively) create a new blue.

- *Repeat*.



In the next case of (***Fig. t2***), because this is an internally expanding process, each new generation creates a new layer that sits on top of the parent layer and is a mirror or inverse of the parent (***Fig. t3***) creating an oscillation over generations and has its own contextual version of *frequency* and *wavelength*. The oscillation is both generational and fractal, much like genetics which shares this same pattern of oscillation (detailed in "*The Tholonic I-Ching*"). This is an important point to keep in mind, but going forward, we will only show the additive, primary, or *dominant* (to borrow a word from genetics) colors of RGB and ignore the subtractive, secondary, or *recessive* colors of CMY.

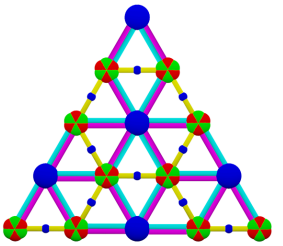
In the images and examples above, we use 6 colors to explain the tholon map. These colors are based on the 3 natural primary and additive colors of RGB and their complimentary and subtractive colors of CMY. These colors highlight many patterns, one of which shows that ultimately everything can be reduced to 2 colors, blue and yellow, for when we additively mix the left and right colors (red and green) that emerge from center blue, we get yellow, the center color of the child of blue, and when we subtractively mixed the left and right colors (cyan and magenta) that emerge from the center yellow, we get blue.

Below, we show the trigrams a bit differently, with the RGB as the points and the CMY as the lines, as this will make for less confusing 3-dimensional models. On **Row 1**, we show the 6-color and the 2-color versions. **Row 2** shows the patterns of the connecting CMY lines. Here, we see 3 basic patterns; a left-handed cube grid, a right-handed cube grid, and a hexagonal grid. The left and right-handed grids are so named to distinguish them as they are offset by half a "cube". With the added shading, it helps to conceptualize their difference. The right-most image shows all the grids together.

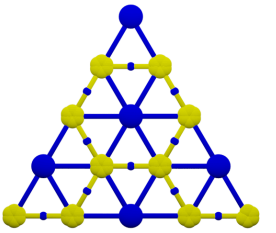
Row 3 shows the CMY lines along with the RGB NDC points they are related to, and the **Row 4** line shows the same in 2 colors.

Row 5 shows a 4-generation, 2-color, 2-dimensional thologram and compares that model with the traditional *Flower of Life*, which uses the same pattern and reasoning, but unlike the thologram, it is external and non-reflective.

Row 1



6 color RYGCBM mode

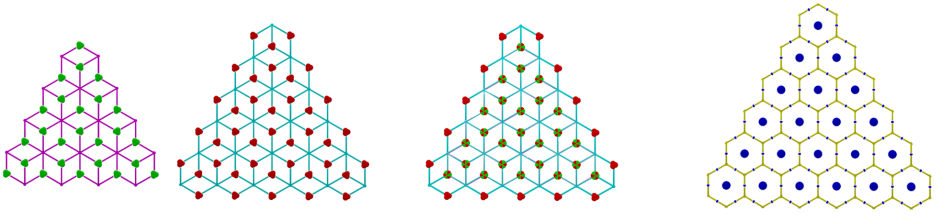


2 color BY mode

Row 2

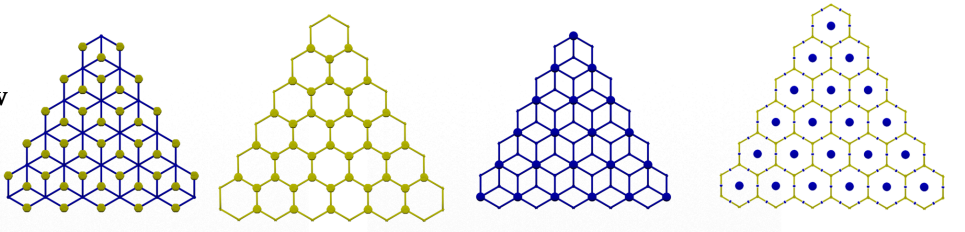
Basic line-only patterns in RGBCMY mode

Row 3



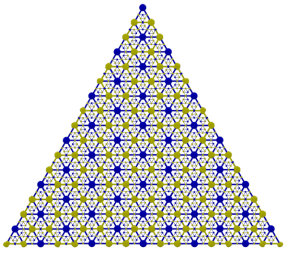
Basic line patterns in RGBCMY mode with NDC points

Row 4

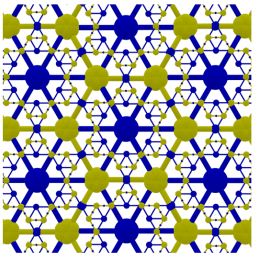


Basic patterns in BY only

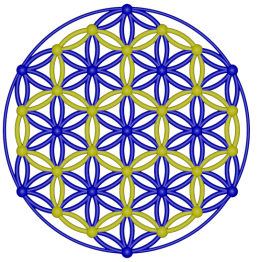
Row 5



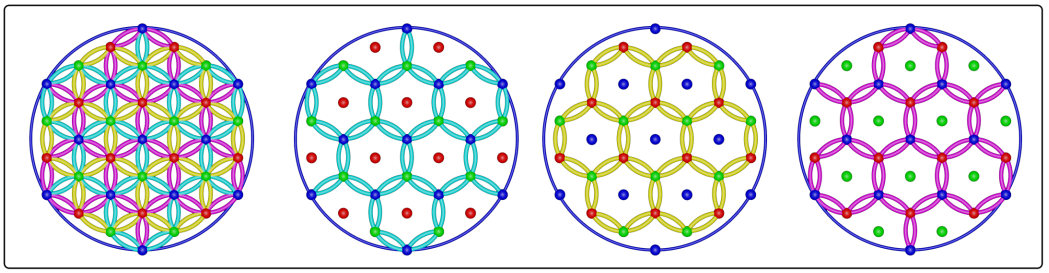
4 generations of tholonic trigrams

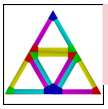


Close-up of embeds in two color



Compare to traditional
Flower of Life in two color





We also see a few other interesting details in the way the trigram is formed, such as how the *Contribution* of red is introduced into the *Definition* of green (on the right side) . Can we say the same thing for how green is introduced into the red , such as it appears on the left side? No, because there is an order to the points of *blue green → red*. Green existed *before* red; therefore, it is the red that is introduced to the already existing green point.

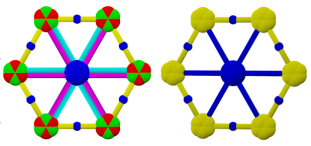
In other words, the reality of a thing contributes to the definition of a thing, and the definition of a thing is limited by the reality of a thing. This is so obvious it sounds silly to even state, but here we are dealing with the most fundamental properties of creations, which are the simplest, obvious, and basic laws.

In the world of math and geometry, this internally expanding trigram is similar to something called a *Sierpinski Triangle*, which is a foundational pattern in nature that has many real-world applications, such as broadband antennas, musical composition, mathematics, and chemistry.

The difference between the thologram and the Sierpinski Triangle is in the Sierpinski Triangle, there is the concept of 2 types of trigrams, those that are capable of self-replication (the black trigrams), and those that are (the white trigrams), like this:

In the thologram, we consider the trigram not as an object but as the boundaries that constrain the movement of energy. The fact that the center trigram is a reversal of the three outer trigrams is evidence of the significance of this inner trigram. This difference between the thologram and the Sierpinski Triangle is only conceptual because the math is essentially the same. Still, the thologram considers the negative or empty space as valid as the filled space, with different attributes, which we'll demonstrate.

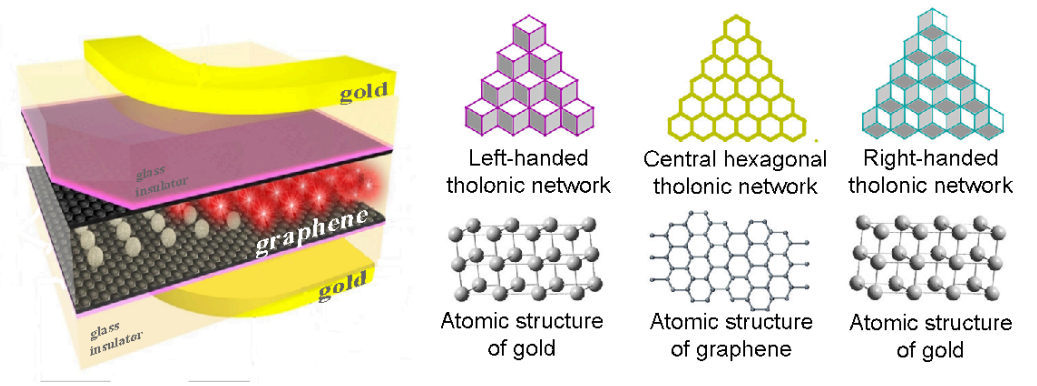
With each generation, we have more and more patterns, such as Fibonacci and harmonic series, but perhaps the most dominant pattern is the hexagon. In addition to being the crystalline structure of hydrogen, it is one of nature's most persistent and useful shapes. It can be seen in beehives,



Saturn's north pole, dragonfly eyes, rocks, bubbles, snowflakes, organic chemistry, memory function in the brain, neuronal firing patterns, etc., as well as being the most structurally sound of all shapes. The success of the hexagon is because it is a synergetic form, meaning it is a form that can self-assemble and hierarchically self-organize. All synergetic systems, such as all organic life (and arguably the Universe and all its creations), are built upon synergetic principles.

A single layer of hexagonally oriented carbon atoms forms a material called *graphene*. Graphene is superconductive[120], can convert light into energy [121], can propagate electromagnetic signals[122], and given its organic structure, easily integrates into organic systems, such as plants and animals. [123, 124] This structure is not only the basis for life but is the basis for integrating organic life with technology. From the tholonic view, organic life *is* technology, so what is commonly referred to as *trans-humanism*, the merging of the biotechnology of nature and technology of humans, is a natural phase of evolution (although the way this is being approached today, and by whom, leaves a lot to be desired as our current path does not appear to be in the best interest of humanity and unless radially altered, which is unlikely, will result is consequences that will be as catastrophic as they could have been miraculous).

The tholonic structure is not simply a geometrical metaphor but a functioning model and is fundamental to *plasmonics*. Plasmonics, or what is sometimes called *nanoplasmonics*, is the term for electrical interfaces at light frequencies which allow it to perform operations such as changing the direction of light and using light as the source of energy and has the potential of creating electric circuits as small as 10 nanometers. That is 10,000 times smaller than a human hair, or the amount your fingernail grows in one second. Below is a diagram of a *plasmonic* antenna that can receive energy and information and can be integrated into organs, the nervous system, the brain, etc., and is about as close to a tholonic device as can be built.



In the tholonic patterns, we can see how the N-sources converge to form the center of every hexagon and how the opposite colors always form pairs on the outer edge. From this, we get a much better idea of the nature of 0-dimensional, non-existent N-sources, which are, unsurprisingly, at the center of order. We get some clues for answering the question, "*Where did the first N-source come from?*"

Another exciting observation is the little blue dots in the middle of the yellow lines. Why are they important? Those blue dots mark the center of a line that can create new children (stable patterns) or new N-states that form new N-sources. You'll notice that those lines only exist on the outer ring of the hexagon.

As we saw earlier, the N-source (blue) is the progenitor of the subsequent D (green) and C (red) dots and therefore must always precede D and C. However, D and C, having all the attributes of the N, can create a new child version of N. N and D cannot create a new N because it does not have the attributes of C (form), nor can N and C create a new N as it does not have the attributes of D (definition). Only Ns, or N-states, can be created because N-states have no form or dimension, a prerequisite for creating something out of nothing. An N-state is simply an idea or concept. Cs and Ds are no longer merely concepts; they have dimension and form.

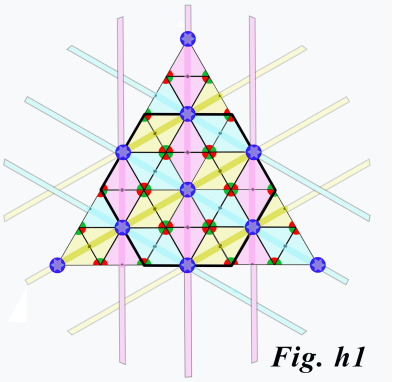


Fig. h1

How a 0-dimensional dot becomes dimensional, which then becomes form, is significant because it shows that even though archetypes can appear across the NC and ND spectrums, they cannot create children, so no N-state will ever appear across these spectrums. However, the CD spectrum, which is the axis of *cooperation* or *conflict* and its opposing point of *negotiation*, can create N-states. As the trigram self-replicates, the hexagram naturally rotates 60° with each iteration, allowing every side of the thologram (4 or more trigrams, or anything after the 1st generation) to be able to generate new N-sources. The graph above (***Fig. h1***) shows the lines connecting the N-sources and their respective N-states (the blue dots). What it shows is that anything that exists will have 3 N-state axes, or 3 expressions, types of instances, and perspectives, that together represent the complete concept.

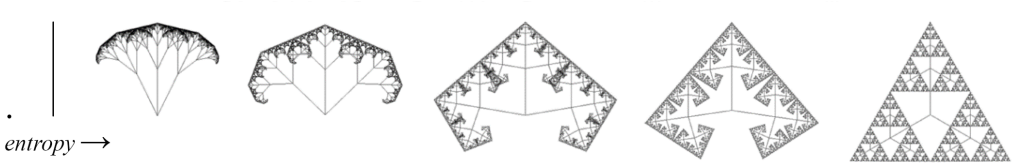
Everything Begins with the Trigram

Just as every element in the periodic table is formed from hydrogen, so is every generation of the thologram formed from the trigram.

A curious observation is if you take the simplest material version of the trigram (hydrogen, atomic number = 1) and the simplest material version of the hexagon (carbon, atomic number = 6), the two most fundamental forms in the thologram, and combine them (6+1=7) you happen to get hydrocarbons, the most basic building blocks of life (and a bunch of plastic stuff), as all life is hydrocarbon-based.

We can also apply the same associative reasoning to the thologram as a whole to show how its structure appears as a pattern of growth in nature. An example of this can be seen in the images below, illustrating the thologram as it grows from an infinitely self-similar 0-dimensional dot to a 1-dimensional line to a 2-dimensional area in the process of distributing itself, balancing its energy and increasing its entropy.

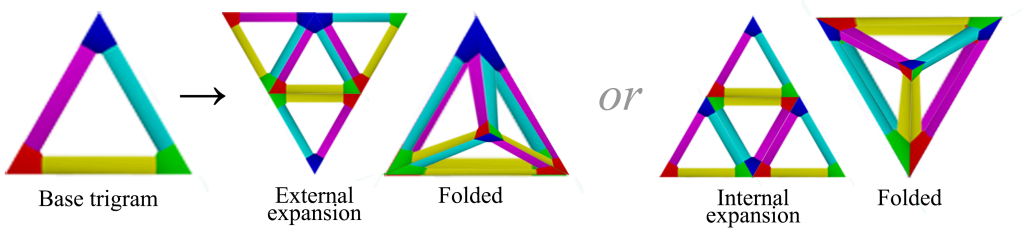
We say that the 0D dot is infinitely self-similar because there are an infinite number of 0s in 0 ($0^{\infty}\rightarrow 0$). Expanding an infinitely self-similar 0D dot into 1 dimension creates an infinitely self-similar 1D line as there is an infinite number of 1s in this 1D line (as $1^{\infty}\rightarrow 1$). The expansion into 2D space is where we see these self-similar children unfold (as $2^{\infty}\rightarrow\infty$). For each dimension that follows, these children would unfold to occupy that space, $3^{\infty}\rightarrow\infty$, $4^{\infty}\rightarrow\infty$, etc.



In the previous example of a Sierpinski triangle, the outer trigrams were solid black, and the center was white. As a 2D *parton*, this white space represents the center trigram. As a 3D *parton* it represents the base of the tetrahedron. As a 2D *holon*, the white represents all the centers of all the children of all the generations, and as a 3D *holon*, the white space forms the 3D shape of an octahedron (much more on this later), which remains empty.

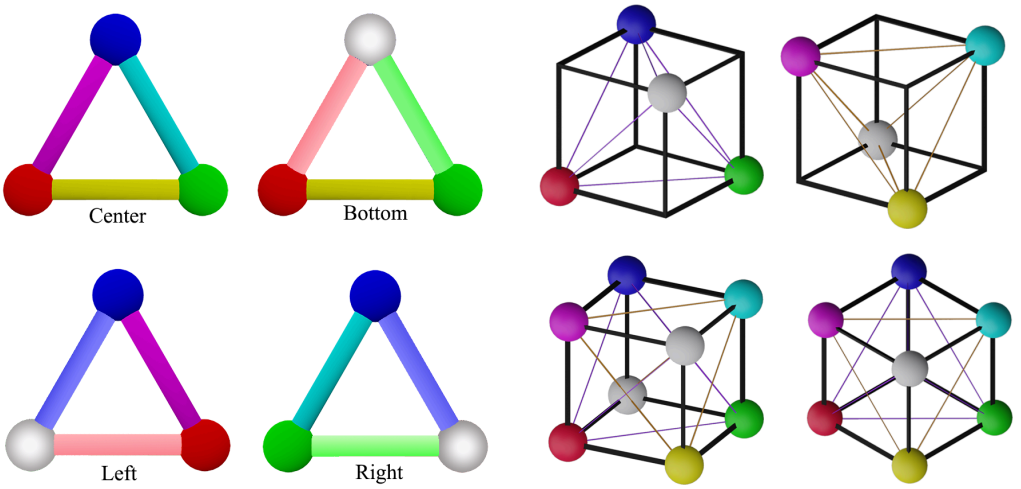
In the diagram above, we are using the Sierpinski triangle again and only showing the borders of the trigrams, which implicitly incorporates the “empty” center trigram. This negative space is just as full of implicit patterns as the positive space is full of explicit patterns, but these implicit patterns exist as a *result of* the explicit patterns, which are continually expanding inwards. In every generation of a 3D tholon, exactly and always 50% of each tholon is the *nothingness* of empty space, and 50% is the *somethingness* of the 4 children it creates. The octahedral space is never divided, but the tetrahedral space is always divided by 4. As the tetrahedrons produce form (e.g., the tholons that produce reality), it is form (and reality) that is forever approaching the nothingness of 0. The ever-shrinking tholons correlate with the ever-decreasing energy availability (increased entropy), which both lead to the same destination of total dispersion and balancing of energy.

2D to 3D

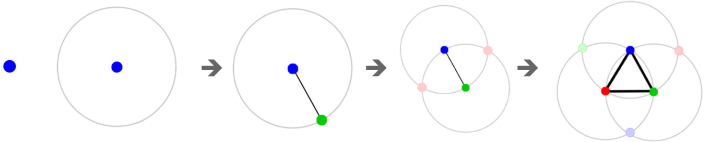


So far, all we have described are 2D trigrams. It’s been shown how the 2D shape of trigrams defines a 3D tetrahedron, but nothing has been said about how this self-similar grid of trigrams becomes a self-similar grid of 3D tetrahedrons.

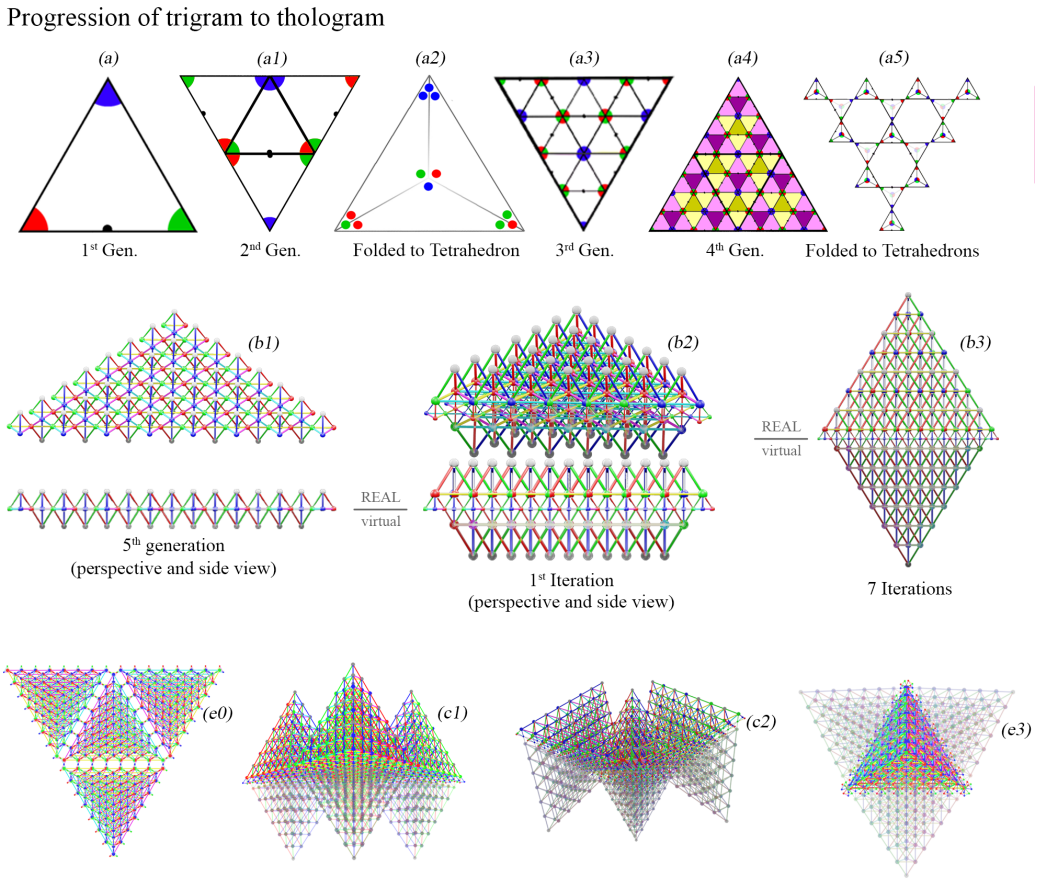
A note on the colors used: When coloring 2-dimensional trigrams, the color choices are straightforward because the RGB/CMY model is tertiary. When we move the 2D trigram to a 3D tetrahedron, a new dimension appears, represented by the white-dot created by the 3 pure colors. This naturally adds a new dimension of lightness to our colors, but this also means that all sides of a tholon are different. As a tetrahedron, rather than 2 colors mixing to make a new color, which in 2D only happens on one face, 3 colors are mixing with white, creating a lighter shade of each color. This is being mentioned because the reader may notice a difference between the coloring of 2D and 3D models. To get a broader perspective of the color scheme and the forms, the image below shows all 4 sides formed by 1 tetrahedron. The right images shows how 2 tetrahedrons, one RGB and one CMY, separate and combine.



We demonstrated how a 0-dimensional dot expands into a trigram.



Below is a more complete, step-by-step description of how this trigram expands into the thologram.



Note: For clarity's sake, each generation of tholon children is referred to as ***generations****, while the tholons that are created from the peaks of these original tholons, and their children, are referred to as* ***iterations****.*

Tholons model the movement of energy and consider the existence of form as the consequence of that movement. With that in mind, let's examine the tholonic explanation using the figures above.

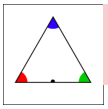


Fig. a. We start with a simple trigram. This defines the most fundamental structure of how instantiations of archetypes come to exist and, therefore, the flow of energy and their resulting forms.

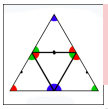
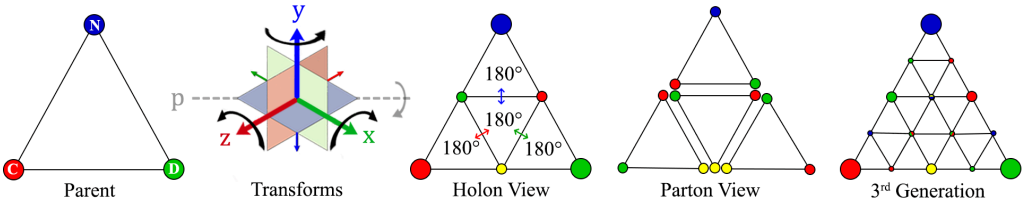


Fig a1. The movement of energy inside this trigram will cause a new trigram to form by the expansion of N-sources due to the flow of energy. The most likely place for this new form is opposite the energy source and in the balanced center between the two limiting poles created by the source. Expanding this new N-source further divides, defines, or limits the parent's scope, resulting in 4 new trigrams.

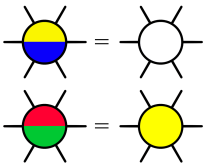
This division process is the basis of the thologram and, we claim, the basis of all creation, so it's worth a bit more explanation.



In the image above, *Holon View* shows this division from the parent's perspective. The resulting divisions produce trigrams that are transformed in a manner shown by *Transforms* where each outer trigram is a transformation of 180° rotation of the center trigram, which is the same transformation of the parent trigram. This result is the top trigram being identical to the parent trigram, but similarly transformed around a different axis. All total, 4 transformations take place, each of 180°, for a total of 720°, or two complete rotations of a cycle. As a holon, the core trigram is the center trigram, and each outer trigram is a different context of *Negotiation*, *Definition*, or *Contribution* for that tholon.

The "parton view" shows the divisions as 4 independent trigrams, each with its own 3 points of NDC. However, as only blue N-sources can create the red and green children, the trigrams operate differently as independent elements resulting in different colors (properties), showing us that the same instance shares different properties of holons and partons. Consequently, when all the partons are working together, not as a holon, but as integrated partons, which contributes to the holon, the dots 🔴🟢🔴 and 🟢🔴🟢result in 2 yellow dots. Why yellow and not brown (🔴+🟢+🔴=🟤) and dark green (🟢+🔴+🟢=🟢)? Because we are not considering the quantity of the properties but rather the qualities, as in the relationships between the properties and, as was previously shown, the 🟢⟷🔴relationship is one of definition and contribution, or limitation and form, imposing on one another. In this example, the color yellow represents challenges, trials, testing, contention, and cooperation. Not coincidentally, this fits quite nicely as the opposite of yellow is blue, which, in this example, is the color of unity, 1, the singularity.

In *3rd Generation*, this same process takes place in each of the child trigrams, and we get the 1st instance of a hexagon, but not a single hexagon, but a trigram of 3 hexagons. It is difficult to see in the image above, but if we zoom in (right image) on these 3 primal hexagons, we see that the core of the top hexagon is a mixture of blue and yellow, which is white, and the 2 lower hexagons have a core that is red and green, which is yellow.



Note: Colors are used in this example because colors are another way to see the rules of energy in action, but we are not claiming these colors have these properties, as other expressions of energy could have also been used in this example, but as they are invisible, it would be difficult to show the relationships.

As was shown above, the arrangement of the colored points (N, D, & C) in each outer trigram is the exact reverse image of the center trigram. One way to think about it is the original trigram (top-most) reflects and reverses itself and, by doing so, creates a new trigram (center), which also reflects and reverses itself in the 2 new trigrams

(left and right). In this way, the center trigram acts like a reverse reflection trigram, and the 2 new trigrams are a reversed reflection of a reversed reflection. This will be an important point a little bit later.

Note: We will use colors (RGB) rather than types (NDC) because it is easier to understand the geometry of a tholon using well-understood concepts like colors. You can remember that N=blue, D=green, and C=red, but it does not really matter for these descriptions. When it does matter, we will return to NDC labels.

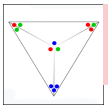


Fig. a2. Because energy always follows the path of least resistance and always seeks balance, this complete tholon will automatically become a self-sustaining structure (tetrahedron) when all the conditions are met, as it would represent the most efficient form. These conditions appear to require 4 types of points; 🔵🔵🔵BBB, 🔴🟢🔵RGB, 🔴🟢🔴RGR, and 🟢🔴🟢GRG. Apparently, 🔵B points only integrate with themselves and with an 🔴R and 🟢G together, while the 🔴R and 🟢G can integrate with each other.

We see the above pattern when any 2 things interact with each other ,*and* can form more energetically stable, efficient, balanced relationships. For example, hydrogen and oxygen atoms form a stable state that requires less energy or conserves energy than both require to maintain a separate existence.

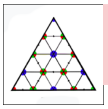


Fig. a3. Each of these child trigrams goes through the same process as the parent, with slightly different parameters determined by their parent's limitation. We can now see 4 trigrams of 4 trigrams in their 2D form.

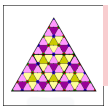


Fig. a4. This is a 4th generation tholon map. To get an idea of how many sets of tetrahedrons it holds, the trigrams have been color-coded to make it easy to see. The darker colors represent what will be the base of a tetrahedron, with the light shade of the same colors representing their sides. You'll notice that there are six sets of trigrams that are yellow (or a lighter shade of gray). These are identified a little differently because when they form a tetrahedron, they do so by going in the opposite direction because they are a reversed reflection image.

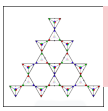
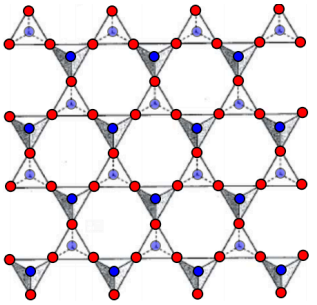
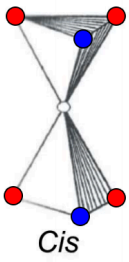
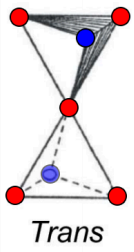


Fig. a5. If we go ahead and form the tetrahedrons, we end up with a series of tetrahedrons connected at the corners, some pointing forward and some pointing away (the more faded ones). You'll notice that every odd-numbered row (rows 1,3,5,7) are all *forward* trigrams (trigrams with blue N-state parents), which we'll refer to as *real*, a term taken from the world of holography to indicate that the image is projecting in front of the film. Likewise, all even-numbered rows (rows 2,4,6) point in the opposite direction (trigrams with yellow N-state parents). We'll call these *virtual* tholons, a term also taken from the world of holography, referring to an image that *virtually* exists behind the holographic plate. For every pair of rows (1&2, 3&4, 5&6) there are an equal number of real and virtual tholons.

This structure may look familiar to a mineral chemist, as this is the same structure as the silicon dioxide crystal *tridymite* (shown below), a form of quartz. Other silica-based oxides also share a similar structure. This detail is mentioned later in this chapter when we look at how water also shares this structure.







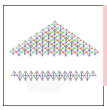
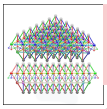
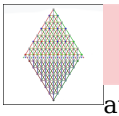


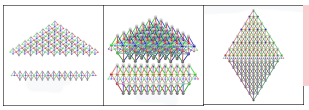
Fig. b1. This is a side view and elevated view of 5 generations folded into tetrahedrons. Those pointing up are *real*, and those pointing down are *virtual*. This is where we see the first instance of oscillation, with the tholons alternating in their movement away from and towards their originating plane or between the virtual and real states.



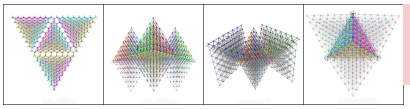
But what is happening in ***Fig. b2***? Why are there more tholons stacked on top and on the bottom? If you managed to slug through up to this point, congratulations! Here is where we get to see the engine of creation. Each of these new trigrams formed by the peaks of the previous children acts as the base for new, larger tholons! The process that created the first tetrahedron starts over, not only for each one of these trigrams but for every face of a tholon or trigram, including its children (which can't be shown here as it is too complex and detailed for a 2D print image).



How can new tetrahedrons appear? You'll notice that the peaks of the original tetrahedrons are the *white dots* ◯, which is to say, each peak has the attributes of red, green and blue, allowing them to act as a red dot, green dot, or blue dot ◔, and if they *can* act as R, G, and B dots, they *will*. When they do, they naturally create a new generation of white dots. If we start with a finite set of folded tetrahedrons, eventually, this ever-growing iteration of tetrahedrons will end, as each iteration's number of *real* tholons is less by one generation, and the number of *virtual* tholons is less by two generations.



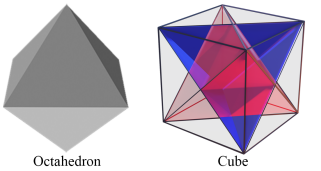
Each iteration builds on the one before it, making larger and larger tholons, as you can see in ***Figs. b1, b2, b3***, which shows the progression of real and virtual tholons.[125] Interestingly, the growth pattern of tholons is the inverse of a recursive Fibonacci sequence. Inverse, because we are multiplying instead of dividing, recursive because we do that for each trigram, children of trigrams, children of children of trigrams, etc.



It is difficult to imagine how each side of a tetrahedron can go through this same process, but we can imagine the final state. ***Fig. c0*** shows an orthogonal view of the tholonic matrix on all four sides of a 2D tholonic map, as in ***Fig. a1***. ***Fig. c1*** shows the perspective view, with *real* tholons above and *virtual* tholons below. ***Fig. c2*** shows the same perspective view, but where the sides have begun to fold up to form a tetrahedron. ***Fig. c3*** shows the final view with the real tholons creating a tetrahedron and the virtual tholons projected out from each side of the tetrahedron.

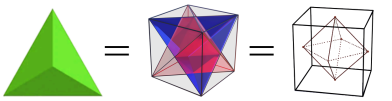
It looks like we have broken the rule that no children can exist outside their parent's limits because we have a lot of virtual tholons sticking way outside those limits. Virtual tholons are reverse reflections of the parent tholons. In one sense, these *virtual* tholons do not exist any more than your reflection in the mirror puts you on the other side of the wall, but it *does* exist in that the reflection is a perfect mirror-image representation of you, and this has significant value as mirrors have a measurable effect on energy (light). It is an illusion, but an illusion that affects reality.

We started with a 2D map that was folded into a 3D form, and in the 3D space, no more folding can occur, but the 3D form can be folded into a 4D form, which can be folded into a 5D form, etc. We end up with a thologram that is a perfect tetrahedron made of an (approaching) infinite number of smaller tholons. On the 4 outer-most surfaces of this tetrahedron is a single layer of the tholonic matrix of *real* and *virtual* tholons, with the *virtual* tholons facing outwards into *nothingness*.



While the outer form of *real* tetrahedrons looks like a tetrahedron, it consists of 4 child tetrahedrons, each made of 4 child tetrahedrons, ad infinitum. This tetrahedral stacking leaves gaps. The shape of that gap is that of an *octahedron*, or a *square bipyramid*. This is mentioned because the tetrahedron and the octahedron can be converted into each other by means of the Golden mean (phi, φ, 1.618), and together they form a pair of shapes that can fill every part of space (*tessellation*). The only other shape that can do that is a cube, which is itself defined by 2 tetrahedrons. In other words, the only archetypal forms that can occupy all space are the forms that are created by the tetrahedron.

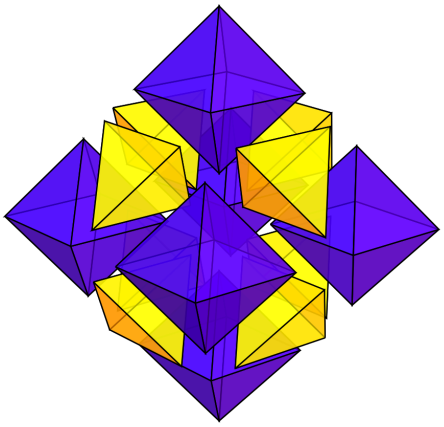
Besides being an interesting factoid, the tessellating abilities of these forms are surprisingly informative, at least regarding the thologram. For example, in the thologram, there are tholons (tetrahedrons) and octahedral gaps. These gaps represent nothing, or rather, *nothingness*, as there is nothing there. Perhaps that is why the octahedron is the least "dense" of all polyhedrons ("dense" is the geometry term that refers to the number of times a polygon boundary wraps around the center). The only difference between the void of nothingness and the nothingness of this gap is the difference between limitlessness and the limits imposed by the tholons that define the shape of this nothingness. As this limited nothingness is in the form of an octahedron, it is the octahedron that represents *nothingness* in the context of *somethingness*. The tessellating ability of the tetrahedron and the octahedron is a representation of the reality that everything that exists is composed of *somethingness* and *nothingness*. The cube, the only *single* shape that can tessellate, is the basis of both *nothingness* and *somethingness*, from the tholonic perspective.



A pair of tetrahedrons make a cube, and if we connect the centers of each face of that cube, we get an octahedron. So, the octahedron is the result of the cube, and the cube is the result of the tetrahedron. This defines the natural order of progression as tetrahedrons → cube → octahedron . In addition, a complete tholon (which is described in more detail later) is both a *real* tholon ***and*** its *virtual* counterpart, so from a tholonic perspective, the cube, which 2 tetrahedrons can create, is actually created by a single *complete tholon*.

The Shape of Reality

What does this have to do with reality and the Universe? The most obvious observation up to this point is that while the cube describes the structure of our 3D material reality nicely, the tetrahedron describes the structure of concepts, which precede form. Understanding form will tech us something about the energy, *tholonic energy*, behind reality.



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We know a tessellated tetrahedron can be formed with 4 tetrahedrons and 1 octahedron, but an octahedron, the shape of *nothingness*, can also be formed with 4 tetrahedrons and 6 octahedrons. These tessellated structures illustrate that both *somethingness* and *nothingness* are self-similar and fractal. If we assign the length of a side to 1, or *unity*, we can see that a tetrahedron has a volume of 0.11785 (V_{t1}), and an octahedron has a volume of 0.4714 (V_{o1}).

4 tetrahedrons and 6 octahedrons create a tessellated octahedron, and there relationship to one another is quite interesting. The total volume of the tetrahedrons comes to 0.4714 (0.11787 × 4, V_{t4}), and octahedrons comes to 2.828 (0.4714 × 6, V_{o6}). The first thing we discover is that 2.828 is also $\sqrt{8}$, and 0.4714 is the $\sqrt{0.2222222222}$, which is intersting. The next thing we see is the total volume of the tetrahedrons is equal to the singular volume of an octahedron, V_{t4}=V_{o1}. More interesting is that the ratio of $\frac{V_{o6}}{V_{t4}}$ (or $\frac{nothingness}{somethingness}$) is 6:1, which is to say, *somethingness* represent $\frac{1}{6}$, or 16.666%, of *nothingness*. That sounds ridiculous, that is, until we discover that it is not:

> *"In January 2015, the results of the Planck satellite of the European Space Agency (ESA) were published. The high sensitivity of Planck allowed us to estimate the amount of matter and energy in the Universe with a precision of just a few percent. In particular, we now know that all forms of matter as we know them (atoms, radiation, and all sorts of exotic particles) only account for 16% of the Universe's matter, the rest being in an unknown form that is usually referred to as dark matter."* [126]

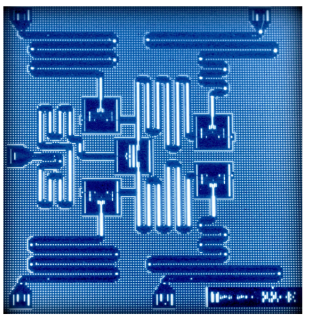
We could call this a fascinating coincidence, or we might wonder if the shapes that can describe all matter and occupy all space might have a relationship to… all matter and all space. If so, then dark-matter appears to be how *nothingness* instantiates in our material Universe.

But there might be much more to this incredibly coincidental relationship. For example, we live in a Newtonian world where *cause* is followed by *effect*, mass and energy follow the rules, and nothing travels faster than the speed of light, thereby preventing "spooky actions at a distance", to quote Einstein. Everything we think, believe, and build is based on these laws of reality, and millions upon millions of tests prove that reality is built on these laws.

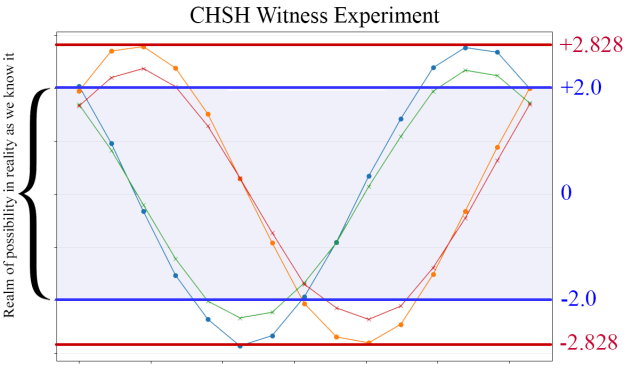
Then quantum physics crashed the party. Now, tossing a coin a million times may or may not result in 50/50 heads/tails. The *Bell Inequality Theorem* make the quite reasonable claim that if the laws of reality can be broken, then reality, truth, and facts as we know them are not what we think they are. That was in 1964, and since 1972 scientists have been using reality, truth, and facts to prove that reality, truth, and facts may not be real, true, or factual.

Without getting into the details, an experiment was set up with conditions where the results of 2 tests could only be 0 or ±1 according to Newtonian and Relativistic laws of *realism* and *locality*. If the test results went past ±2, that would prove that reality as we know it is not reality as it actually is. The test results were in the range of ±2.828. This test is called the *CSHS Witness Experiment* [127].

I personally ran this experiment using quantum spin on IBM's quantum computer (image below), not that I doubted the claims of brilliant scientists. I just wanted to see it for myself. Discovering new realities is fun and interesting, but the real miracle of this test is that humanity has created the tools and infrastructure that allows anyone to access a quantum computer and reality-testing experiments from a flat with limited water, stolen electricity, and a collapsing ceiling, in a poor neighborhood in an economically and politically devastated South American country, which is where I happened to be when I ran this test.



Resonators conneting the qubits in IBM Quantum

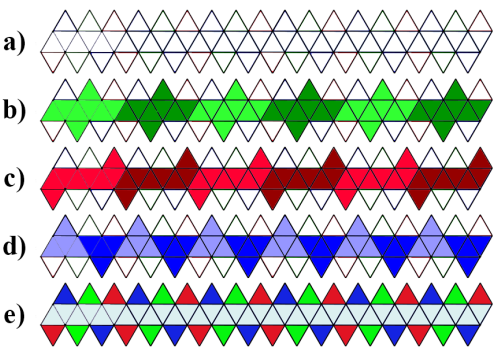


Besides proof that reality is not what we think it is, it also shows that the difference between our Newtonian and quantum models of reality was between 2 and 2.828. What jumps out is how this ratio of $\frac{2.828}{2}$ is $\sqrt{2}$. OK, that's interesting, not just because the two different realities are based on the same pattern, e.g, $2 \times \sqrt{1}$ for Newtonian results, and $2 \times \sqrt{2}$ for quantum results, but also because we see this same pattern in the volumes of 6 octahedra (V_{o6}) and 6 tetrahedra (V_{t6})!

How so? $V_{o6} = \sqrt{2} \times 2$, or 2.828, and its inverse is $V_{t6} = \sqrt{2} \div 2$, or 0.7071. This further confirms that the tetrahedron and the octahedron are a pair of opposites, 2 sides to the same coin of reality. Together they create the value of 2, as $V_{o6} \times V_{t6} = 2$, but when compared, $\frac{2.828}{0.7071} = \frac{\sqrt{2} \times 2}{\sqrt{2} \div 2} = \frac{4}{1}$, they create the ratio of 4:1 (or 1:4, depending on the direction of the math), suggesting that it takes 4 to create *unity*. And what is 4? It is the 3rd instance of the binary tree that begins with 1, i.e., 1→2→4. And where do we see how all these patterns come together? In the tholon, a tetrahedron is made of tetrahedrons.

We also see the octahedral/tetrahedral patterns of the tholon in other ways. For example, an octahedron is 2 essentially tetrahedrons in that an octahedron has 8 trigram faces, and a tetrahedron has 4 trigram faces.

We can see the relationship between tetrahedra and octahedra in the image below.



a) is the simplest possible pattern from which tetrahedrons and octahedrons can be made.

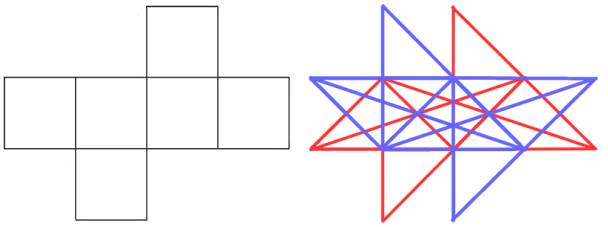
In ***b)*** and ***c)*** we see the pattern that creates 6 octahedrons. These are the only 2 unique patterns that can create an octahedron, as any other pattern is just a reversed and/or flipped version of these patterns. Outside of the context of an octahedron, we can see that ***b)*** and ***c)*** are the same pattern but shifted by exactly $\frac{2}{7}$ of the pattern for an octahedron. Why is the pattern divided into 7 sections? Because the 6 trigrams that define the width of the set of trigrams for an octahedron create 8 vertical divisors, and 8 divisors create 7 divisions. We also see this natural division in the *periodic* table of elements, which classifies all elements into 7 *periods*. We'll refer to these patterns as *left-hand* octahedrons and *right-hand* octahedrons.

In ***d)*** we see we can create 12 tetrahedrons from this same pattern. This pattern is perfectly symmetrical.

In ***e)*** we combine all three patterns and their colors (additively).

We see how 12 tetrahedrons can become 6 *right-hand* octahedrons or 6 *left-hand* octahedrons. This creates a triad of a tetrahedron with a pair of opposing octahedrons. To put it tholonically, *somethingness* creates 2 types of *nothingness*. We can tie this back to the earlier subject of chaos; *nothingness* is chaos, and as there are 2 types of chaos, low-entropy, and high-entropy, we can say that the existence of something creates low-entropy chaos or high-entropy chaos. This is compatible with the archetypes just shown as well as reality.

In the same way, a cube is 2 tetrahedrons in that a cube has 8 vertices, and the 8 vertices of 2 tetrahedrons perfectly match those of the cube. However, this vertices relationship, which is very efficient and tidy in 3D, is a complete mess in 2D.



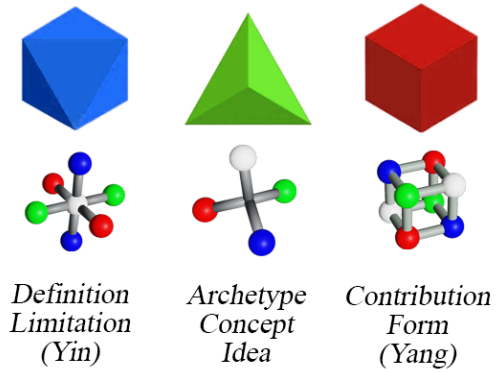
This tells us that a tetrahedron has a fundamental, more primitive, and therefore a higher priority relationship with an octahedron than a cube. However, the octahedron has a closer relationship with the cube in 3D space.

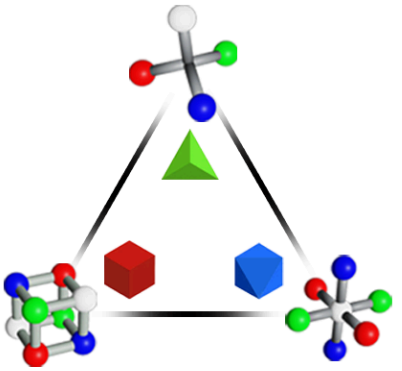
A tetrahedron has a 1:1 ratio of faces to vertices, with 4 faces and 4 vertices, and is the most balanced and stable form that can exist in 3D space and is composed of only the most balanced and stable form that can exist in 2D space, the trigram, with 1 face and 3 vertices. From the tetrahedron form, in 2D space, we can create the octahedron, which has 8 faces and 6 vertices, a 4:3 ratio. In 3D space, the tetrahedron can define a cube, with 6 faces and 8 vertices, a 3:4 ratio.

The inverted ratios make the cube and the octagon an inverted pair. We end up with a 6-step progression from dot → line → trigram → tetrahedron → octahedron → cube. For this reason, the cube, which incorporates all previous components of dot, line, trigram, tetrahedron, and tetrahedron, defines the crystal structure of 90% of the elements, which are cubic-based. 9 elements that you never heard of and are extremely rare are double-hexagonal. However, there are only 3 hexagonal elements. If our reasoning above was correct, we would expect these 3 elements to be more fundamental than the cubic elements, are they are. These elements are hydrogen, carbon, and nitrogen, 3 of the 4 most common elements on this planet (oxygen, the simplest of all cubic structures, being the 4th), and which are the required elements to create life (proteins). Of course, hydrogen is the most common element in the Universe and the source of all other elements.

This creates a new perspective of the tholon. These 3 related structures are 3 different perspective of a singular concept, similar to how current, voltage, and resistance is to the concept of electricity, or force, acceleration, and mass are to motion. With these geometric shapes it is easy to visually see how they relate. We can see that the octahedron and the cube are the exact same structure, but are slightly “off” centered from each other. We can also see that the tetrahedron defines the vertices of both of those structures. We could say the tetrahedron defined the potential of the other 2 structures. In the same way, we could say that the 3 axis of the octahedron defines the limits of of the shape, as in the *x*, y, and *z* of 3D space, and the cube is the maximum possible expressions of that the potential limited by the *x*, *y* and *z* space. This very neatly equates the tetrahedron → voltage, octahedron → resistance, and cube → current, and, therefore, tetrahedron → *Negotiation*, octahedron → *Definition*, and cube → *Contribution*.

How does *Negotiation* (balance) equate to voltage? As was mentioned, the Negotiated state is a balanced pattern of energy that has emerged within a duality. What is implied then is that this movement of energy creates pressure, and electromotive pressure *is* voltage. An imbalanced state can not sustain the movement of energy. The greater the balance, the more it can sustain the movement of energy. In short, a *Negotiated* state allows for the movement of energy which creates pressure which is voltage.





Previously, we referred to the tetrahedron/octahedron/cube as symbolic of *something-ness/nothingness/form*, and while that is true in a symbolic sense, it is obviously not true in the real sense, as the octahedral is an actual shape that is ubiquitous in nature, such as in fluorite, diamonds, and other minerals. Likewise, there is no such as a total nothingness or total somethingness. However, we do have the concept of that which is receptive, dark, cold, dead, infinite (nothingness) and that which is creative, light, hot, energetic, and finite (somethingness). These concepts have been around since we grokked the difference between dead and alive over 2.5 million years ago. The modern world has its own versions in concepts such as physics' protons/electrons, technology's 0/1, finance's debt/credit, Descartes' mind/body, science's reductionism/holism, hierarchy/unity, concrete/abstract, evolution/devolution, discrete/continuum, time/space, etc.

Such modern dualities are as neatly encapsulated in the ancient Taoist concept of *yin* and *yang* as were the dualities of our distant ancestors. When speaking about the material word where *somethingness* and *nothingness* have no real instances, it's more practical to speak in terms of *yin*/*yang*. Tholonically, we can say *yin* is the movement from order to high-entropy, and *yang* is the movement from low-entropy chaos to order. We can also say that any patterns or structure that allows for the the distribution of energy is *yang*, and the actual distribution of energy as *yin*.

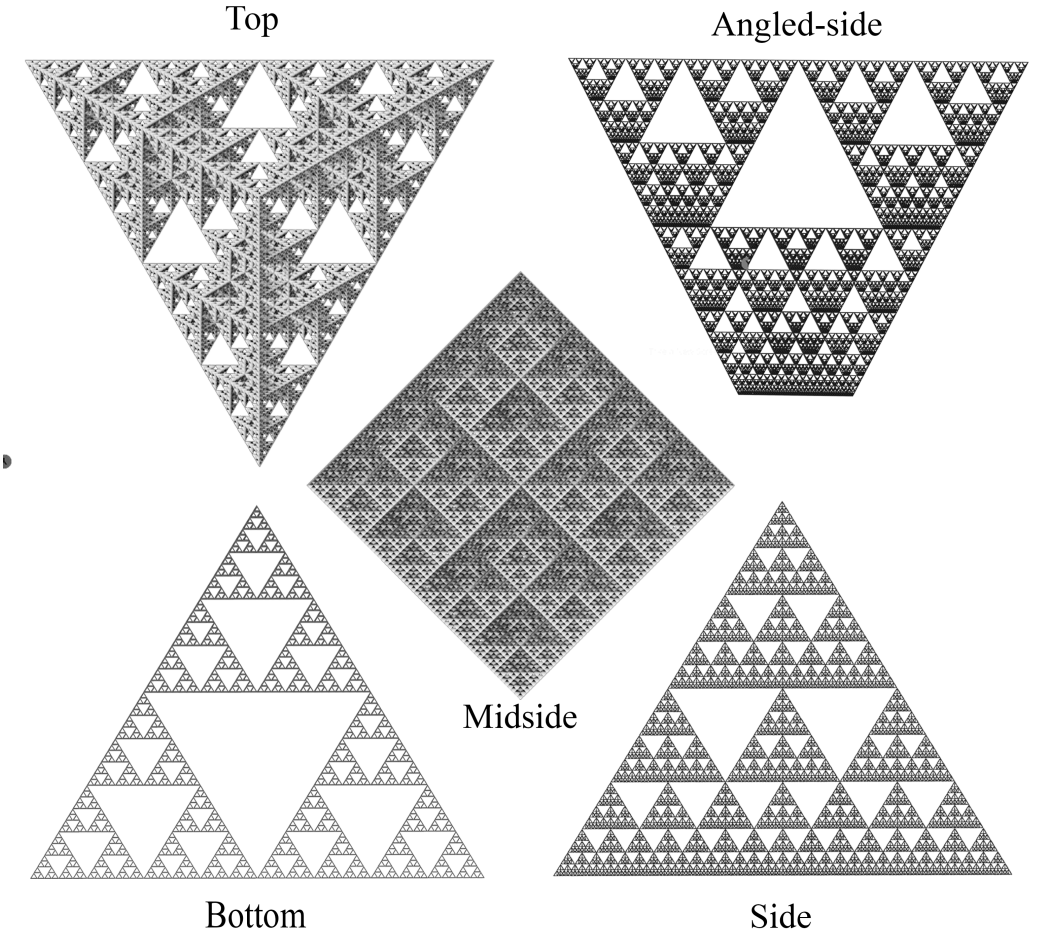
In this context, the octahedron is *yin* in nature, while the cube is yang in nature. Likewise, *body-centered* cubic structures (cube) are *yang* in nature, while *face-centered* cubic structures (octahedron) are *yin* in nature. As an aside, there are 2 elements that combine both structures: silicon and germanium. These are called *diamond cubic* structures (technically, it is a form of face-centered cubic). Silicon, along with oxygen, is one of the main building blocks of planet Earth. Germanium is rare.

We can see this duality in chemistry when we look at the periodic table, as all the alkali metals (H, Li, Na, K, Rb, Cs, Fr) in the left-most are *body-centered* cubic structures and are *very* interactive with other elements. These would be considered *yang* in nature. All the right-most column elements are the "noble" gasses (He, Ne, Ar, Kr, Xe, Rn), so named because they stand alone and don't interact with anything unless they have to. These are all *face-centered* cubic structures and are *yin* in nature. Now we can see the entire periodic chart as moving form *yang* (left) to *yin* (right).

Further confirming the order of these 3 archetypal shapes is how the 1st and 2nd shapes, the tetrahedron and octahedron, tessellate as a pair, and their *Contribution*/form, the the 3rd shape of the cube, also tessellates all by itself. These 2 tessellating forms are the only tessellating shapes of all 75 uniform polyhedra [128].

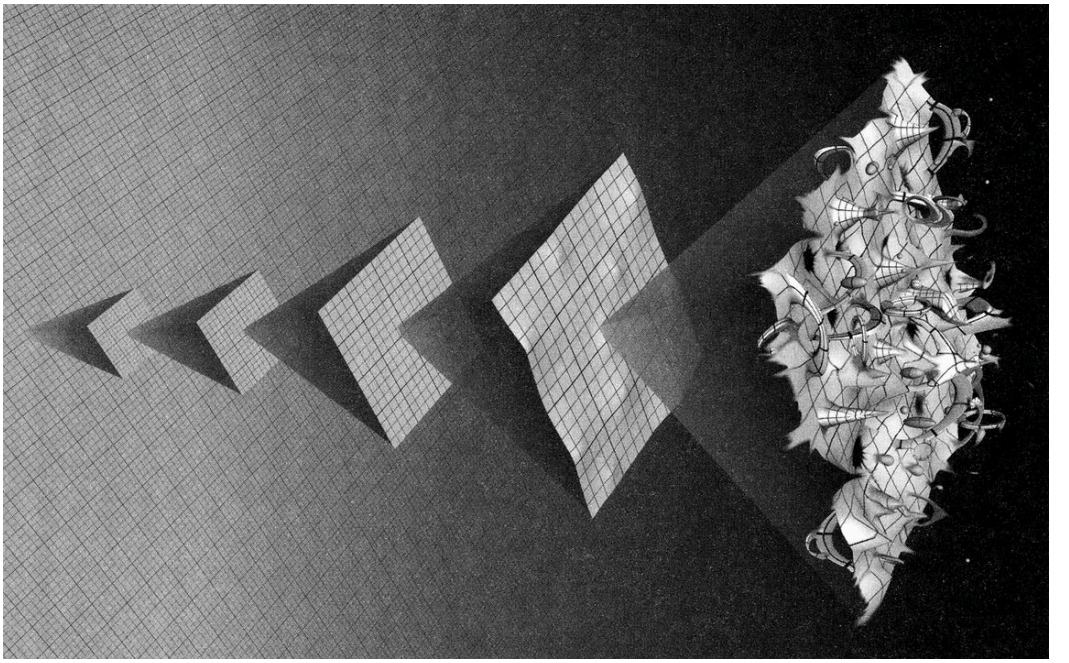
We might conclude from all this that it is the cube that best describes the form of reality, which would be a pretty safe claim considering as we live in a 3D reality. However, we migth also then conclude that it is the tetrahedron that describes ideas, archetypes and concepts, and the octahedron that describes the limitations of context.

For practical purposes, one perspective we can better understand is to look at the *real* tholons and ignore the *virtual* tholons. While *virtual* tholons are just as significant, they are also far more complex, and, for the most part, we will avoid delving into them. This being the case, it is more effective to deal with the structures of *real* tholons, which are identical to a 3D Sierpinski fractal. Below are 5 different views of a 6-level (iterations) thologram. As shown above, the most basic pattern is that of a tetrahedron made of an infinite number of iterations on top of an infinite number of generations, within which there are infinite patterns. The Sierpinski pattern is the most fundamental of all patterns as it is composed of only the most basic of all forms, making it a very stable pattern that will define how energy moves and, therefore, a pattern we expect to see many instances of in reality.



Existential Foam

There exists another model that is conceptually quite similar to the thologram. It's called *quantum foam* and describes where space and time break down into chaos at the quantum level, but from this break down, higher orders emerge. The thologram is similar in many ways to *quantum foam*, but applies to all of existence at all levels. Below is an image from the essay *"Order emerges out of Chaos: the fundamental insight of science"* [129]that demonstrates this idea of the fractal nature of *quantum foam* and which shares some very tholographic concepts.



Note: More in “What π, 2, 5, and e have in common” in Appendix C, “Tholonic Math”.

9: INSTANCES

Examples of how tholonic archetypes instantiate

Synopsis: *The nature of archetypes and their instantiation in various dimensions; the nature of dimensions in general; the geometry of archetypes; instances of archetypes, including quarks, atoms, molecules, batteries, consciousness, society; circuits and society as functional tholonic archetypes; the archetypes of knowledge and form.*

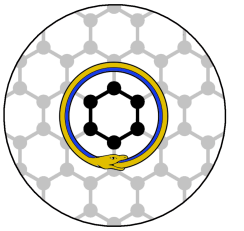
Keywords: *archetypes, dimensions, quarks, atoms, molecules, society, circuits, math, DNA, Newton's 2nd law*

Archetypes

An instance of an archetype can only exist within the limitations of its context. That context can vary wildly, and there can be a lot of discussions as to what defines a context. For our purposes, a high-level definition is that a context is defined by the *innate* limits it imposes, and we define *innate* as that which is inherent in the archetype before it is instantiated. For example, the concept of a car has the innate property of being a ground transportation vehicle because that is how it was designed. Its very structure is specifically intended to be a functional, efficient ground transportation vehicle before any parts were assembled. The same is true for animals and plants. Certain social constructs may be applied to the instances of these archetypes, such as the Western idea that black cats are bad luck or the Eastern idea that pigs are good luck, or a car being used as a home, but these constructs are outside of the concept, or archetype, of something. Males and females are innately different and are formed from conception to perform differently according to their respective archetypes, but social constructs also have archetypes. Whether certain combinations of biological and social archetypes can create stable and sustainable patterns is left to history. The relationship between context and concept is recursive and embedded; context applies limits to concepts, and concepts alter the context, such as how the context of gravity is a limitation to flying, but the concept of air travel changed that context, which then changed the concept of air travel, etc. In the world of biology, context is (usually) a force of evolutionary pressure. In the mechanical world, context is the limits and application of a material.

In the physical world, these limits are usually obvious. In the conceptual world, less so. What are the limits of ideas and concepts? One limit is its definition, which is necessary before it can even be considered a concept. Another limit is in how it is understood, which is a limitation of the conceiver's abilities, awareness, and neurology. Aristotle and Einstein both had theories that described the Universe as finite and spherical, but these two concepts were radically different. Another excellent example is how August Kekulé, a German chemist and one of the founders of modern organic chemistry, fell asleep during a symposium on benzene in 1890 and dreamt of atoms whirling around until they formed an *ouroboros*, a snake devouring its tail. The *ouroboros* is an ancient and mystical symbol representing the eternal cycle of life, death, rebirth, the passage of time, and the completion of effort. The symbol shows the serpent nourishing itself by devouring itself. Historically, the serpent is a symbol of

the god of creation (Africa, Americas, China), immortality, resurrection (Egypt, Celtic, Americas), wisdom (Celtic), and the bearer of good, evil, knowledge, and wisdom (Greek). In short, the serpent feeding on itself represents the immortal soul's endless growth journey in the cycle of life and death, creation and destruction.



From this vision, Kekulé discovered the benzene ring. The context of this concept was the mind and awareness of Kekulé, and the limiting factor was that being a chemist and only interested in carbon bonds at that moment, what he got out of his vision of the eternal cycle of life and transmigration of souls was that 6 carbon atoms form a ring. One has to wonder why such a profound symbol would have even entered Kekulé's mind, given the countless other symbols that could have worked just as well. Kekulé's discovery advanced molecular biology, but he had no idea that 100 years later, the molecule of his vision would result in a "miracle material" that would revolutionize energy, medicine, electronics, food, and even sports; a material that weighs almost nothing and is 200 times stronger than steel, and a material that acts as an interface between biology and technology. This material is *graphene*, and it could change not only the world but also the biological structure of our being as it is already at the core of the emerging trans-humanism. If any compound were worthy of such a profound vision, it would be graphene.

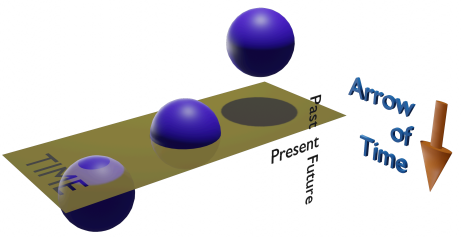
From the tholonic perspective, archetypes have an existence of their own, a direction, and even an intelligence of their own (not to be confused with our human concept of existence and intelligence). Kekulé did not create this dream, as modern psychology would claim. Instead, the archetype itself advanced its cause *through* Kekulé.

The current understanding of an archetype is defined in the Oxford English Dictionary as:

> *The most typical or perfect example of a particular kind of person or thing.*

When we speak of archetypes in the context of tholons, we are using a more general yet compatible definition that an archetype is:

> *A pattern that expressions of energy diverge from and/or converge towards.*



These patterns are not necessarily limited to 3 (or fewer) dimensions. They can be, and often are, multidimensional patterns of which we can only perceive 3 dimensions as they pass through our reality. The classic example of this is the well-known "Flatland" metaphor[130]. Imagine what you would see if you were a 2-dimensional person living in a 2D world and a 3D object passed through your 2D reality. You would see a series of 2D slices of that object that changed over time.

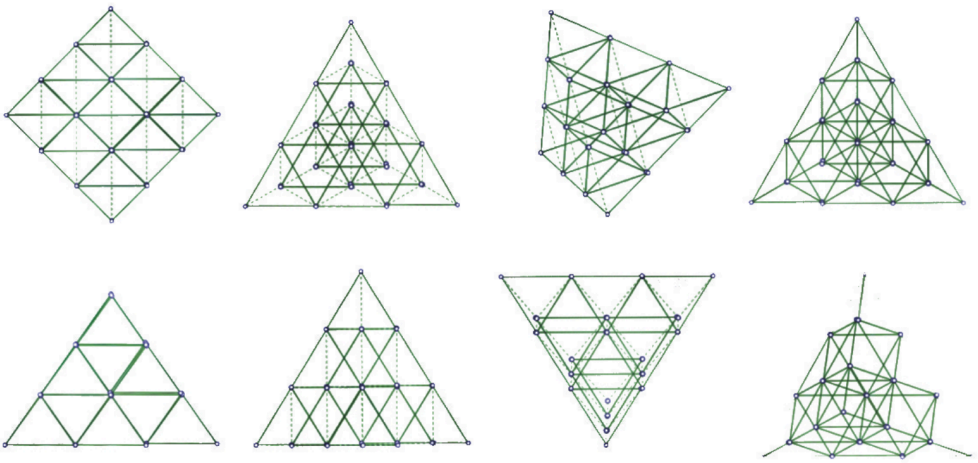
Now imagine you are a 3D person living in a 3D world (which should be pretty easy to do), and a 4D object passes through your 3D world. You will see 3D “slices” of this 4D object over. For example, if a 4D ball passed through a 3D world, it would initially appear as a very tiny 3D ball, then grow to a large ball, then shrink to a small ball before disappearing.

In both 2D and 3D cases, you are not getting the whole picture, but in both cases, what you are getting is entirely accurate and valid for the scope of your reality.

The complete multidimensional thologram, with all its potentially infinite iterations and generations, would look like a perfect tetrahedron in our 3D world. Like in the example of the 4D ball, a 4D thologram, being itself a tetrahedron, would initially appear as a small tetrahedron, which is what we, and others, are claiming all reality is conceptually built from.

Why is this detail important?

The 3D model of the thologram is a 3D slice of a multidimensional concept. What the larger multidimensional object that we see as a tetrahedron actually looks like, we can’t say and probably can’t know. What would an 8D or 248D “object” appear as in this 3D world? It could appear as many, many different things. Look at all the ways a simple 1-generation-only self-similar 3D tetrahedral pyramid can appear in 2D orthographic projections. In this way, a single archetype can instantiate, be perceived, or understood in many different ways.



Now imagine the same tetrahedral pyramid with trillions of generations and many more dimensions! Its perspectives would effectively be infinite to us. What *wouldn’t* it be able to describe?

2D example

The images below are a good example of how one archetype is expressed through different contexts. The archetype is based on the simple model previously described and shown in the diagram on the right. We begin with a 0-dimensional point. This point moves into the 1-dimensional space, which creates a line. In the figures below, we show this initial line as a circle's (black) horizontal diameter. The radius is 90 units, equal to the number of degrees required to best describe a 2-dimensional plane. This 1-dimensional existence of a line then moves beyond the 1-dimensional space and into the 2D space by rotating itself. That movement will be expressed in the 2 dimensions of *x* and *y*, just as the 0D dot that became a 1D line was expressed in the single dimension of *x*. This means there will be a movement along the 1D *x*-axis and an equivalent movement along the 2nd dimension of the *y* axis, which is accomplished via rotation, as rotation is the most efficient way to create a continuous 2D space from a 1D point (and why a circle/sphere is the most efficient continuous shape). Because we are rotating around an originating 0D point, that point will remain the center point.

To illustrate this, we will move the horizontal diameter line 5 units to the right and rotate it around its center point by 5°. These new lines are shown in red in ***Fig. 1***. Now we see that this line is off-center. Where before, as a horizontal line, there were 90 units on the left-of-center and 90 units on the right. Now it is 85 on the left and 105 on the right. It continues its journey into the 2nd dimension by moving another 5 units to the right and another 5° rotation. It continues to do this until the line returns to its starting position of being horizontal. ***Fig. 1*** also shows where the center point is for each line (as yellow dots). The images that follow are instances of this archetypal pattern.

Example of contextual instances of a simple pattern

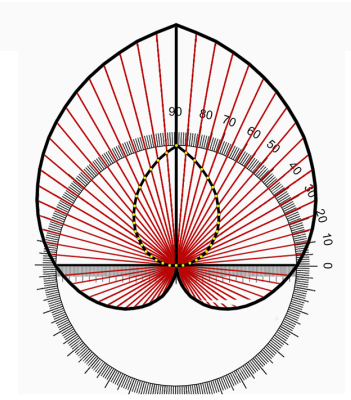


Figure 1

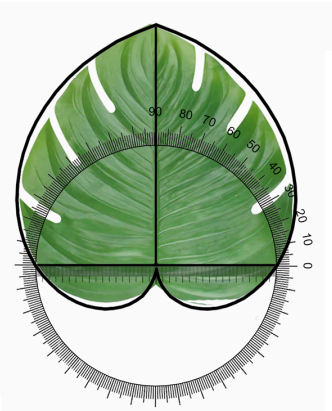


Figure 2
Palm Leaf

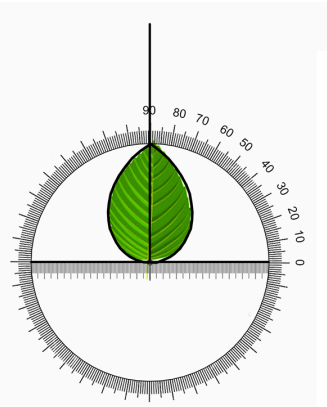


Figure 3
Beach Leaf

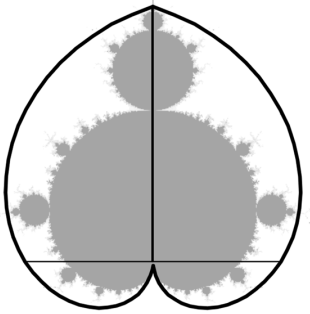


Figure 4
Mandelbrot Set

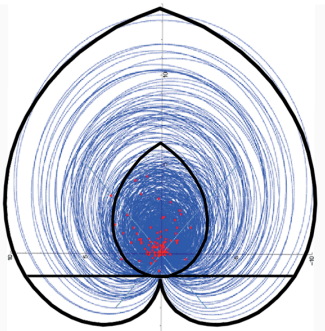


Figure 5
Riemann Zeta Function

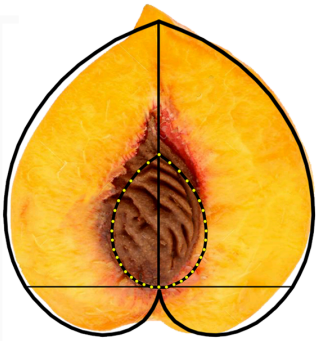


Figure 6
Peach and Pit

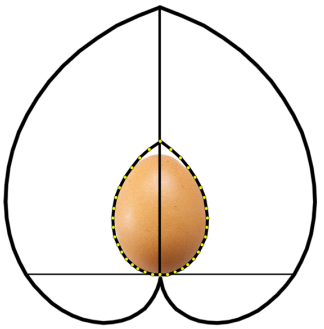


Figure 7
Egg

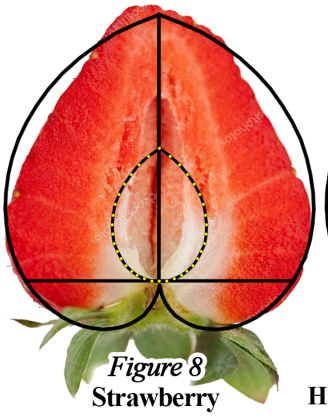


Figure 8
Strawberry

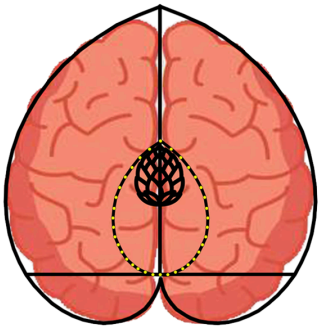
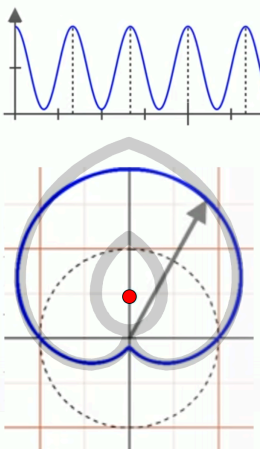


Figure 9
Human Brain (w/ pineal gland)

What is interesting about this shape is how it perfectly describes the archetypal shape of many things, from leaves, fruits, and seeds to number theory, fractals, and even the human brain and pineal gland. More than that, it is essentially identical to the same shape we get when we wrap a frequency around a center-point. The image on the right shows this as a overlay. This is significant because this "wrapping" is basic of the Fast Fourier Transform which can describe all shapes and frequencies, as well as fundamental to the *Uncertainly Principle*, *Riemann Zeta function*, prime numbers, and differential equations. We can speculate a bit here but looking at Fig. 4, the "Mandelbrot Set", above, and seeing how the larger portion of the body is identical to the "winding" form, yet the entire set fits perfectly into the simple form, suggesting that the "winding" form is an instance of one subset, or one part, of the more encompassing simple form.



We have described a very simple model that we would expect to see in nature, which we do, in flying colors.. Because this model can make successful predictions, we can say there is a valid hypothesis. Perhaps this same reasoning is why the ancient Sumerians thought Earth was egg-shaped and not perfectly round, as the Greeks imagined. In fact, Earth is an oblate spheroid, but it is interesting to see how they arrived at different archetypes. In the Greek mindset, Truth was based on what could be conceived, while in the Sumerian mindset, Truth was what *is*. This difference is also reflected in their languages and has led to many modern (Western culture, Greek-based) misinterpretations of ancient texts.

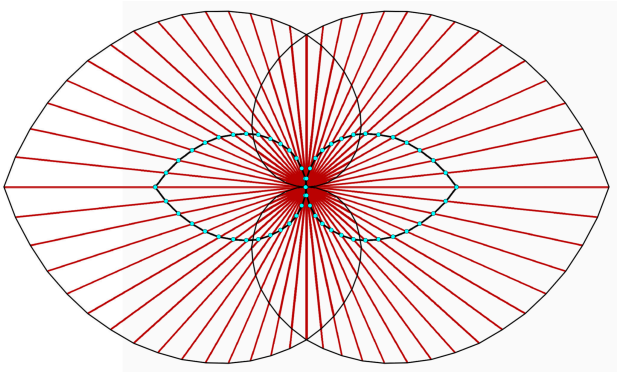
A few of the basic rules we can say about this shape that we can to a broader context are:

- Every shape begins (emerges, evolves, or grows) from the point of 0-dimensional nothingness into a 1-dimensional space and from there into a higher-dimensional space.
- Each expression in a dimensional space will utilize all available dimensions; i.e., if given the nature and scope of an instance that it will move N units, then in a 1-dimensional space, it will move N units in one dimension. In a 2-dimensional space, it will move N units in 2 dimensions, etc. In our example, our line is moved 5 units in a 1-dimensional space. In a 2D space, it moves x by 5 units and y by 5°. In a 3D space, it would move x by 5 units, y by 5°, and z by 5°, etc.
- The point of origin (0D point) remains the center point around which something instantiates, but its location in the lines delineates a significant boundary. The 0D point is the archetype of the child points. The 0D point defines the parent shape, and the child points define a child shape.

Historical footnote: The silphion plant is also a similar shape, similar to the strawberry, but with an interesting historical and cultural footnote as its shape is the origin of our traditional heart symbol. As well as being known to cure many ailments, it was a natural contraceptive associated with love and passion. This plant was worth its weight in silver, which is why the Romans kept 1,500 kilos of it in the treasury as a

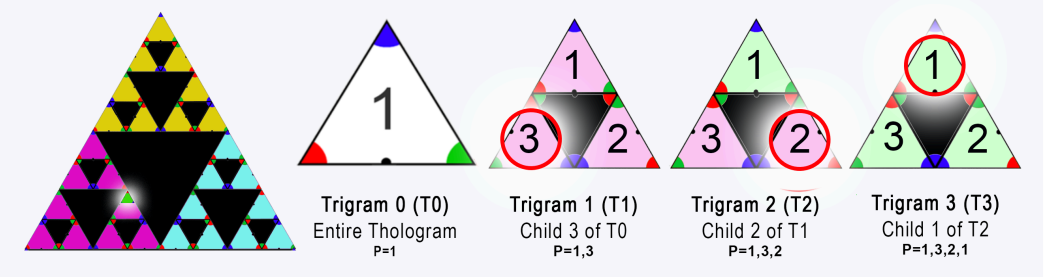
hedge. Coins were minted with the image of the silphion seed, which had the same shape. Sadly, that particular variety was farmed into extinction, with the last known stalk given to Emperor Nero, as the legend goes.

For the sake of completeness, here is what the lines look like when they complete a full 360°:



Revisiting Dimensions

If we are dealing with multidimensional archetypes, then let's look at the dimensions of a tholon. To specify the location of a tholon within the thologram, we have to identify each tholon by an address based on its generation. This is an example of the dimension of *location*.



If we wanted to reference one specific tholon, such as the one highlighted in the image above, we'd need to say it was located at 1,3,2,1 from the top, or it is the 1st child of the 2nd child of the 3rd child of the 1st tholon from the bottom. The areas blacked out are virtual tholons that don't really exist (energetically), so we can't navigate to them even though we can reference them. In this example, we need 4 dimensions to define the location of a tholon. Any dimension would have to record the path taken to arrive at any particular tholon. This is being mentioned to show that each generation of tholons increases the dimensionality of the thologram by one dimension.

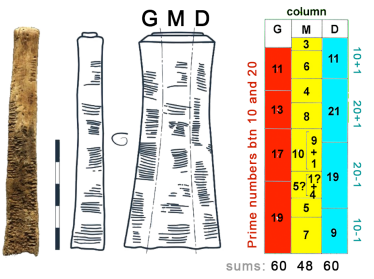
For example, to identify the position (P) of one tholon at the 45th generation, we would need a dimension that looked something like:

Tholon Location=1,3,2,1,1,3,1,2,3,2,2,1,1,3,1,1,1,2,3,3,2,2,2,2,2,2,2,2,3,1,2,3,2,2,1,2,1,1,3,2,1,2,1,3,1

But it's even a bit more involved because this dimension only points to one particular tholon within which is its own 3D space. In the thologram, we can't use a Cartesian coordinate system (i.e., x, y, z) because that would require a coordinate system that extends past the boundaries of existence, and we know that there can be no metrics in nothingness. We can only use *quadray* coordinates (e.g., a, b, c, d) based on a tetrahedron to identify a point *within* the tholon.

Does this mean our 3D reality is embedded within a parent 3D reality? According to the thologram, yes, although I have no idea how this can be tested. An analogy we have to this idea of a 3D reality within a 3D reality is VR (virtual reality), where we can create countless 3D worlds within our 3D reality. Another analogy is how a hologram can create a 3D space from a 2D surface, and there can be many 3D spaces on top of one another recorded on that same 2D surface. These analogies that are used to describe this tholonic concept are similar to the previously mentioned Black Hole Big Bang Theory (BHBBT), which states that the Big Bang was a singularity from matter from a parent Universe collapsing into a black hole, creating a new child singularity, i.e., entire universes within black holes within universes, within black holes, etc., or, embedded self-similar universes.

Synergetics



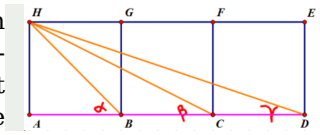
What some people today call *sacred geometry* our ancestors simply called geometry. Contrary to what we learned in school, geometry is as much a study of philosophy as form, space, and mathematics. Plato, Pythagoras, Parmenides, and several other great philosophers were well-schooled in geometry, but the marriage of philosophy and geometry goes back even further in history and across every culture. Take the quadray coordinates system as an example. This system is based on 60°, which comes from the 360° (60° × 6) model of a circle. One could make a case that the Ancient Mesopotamian base-6/60 number system, which gave us the 360° circle, was an early version of this idea. In fact, one could make the case that the 20,000-44,000-year-old *Ishango Bone* of the upper paleolithic era discovered in the Congo was the earliest version of a base-60 system. This bone is considered to be the earliest instance of the concept of the number "1". On this bone are counting marks, 60 marks on one side and 60 on the other. One has to wonder if 60 wasn't chosen for a reason beyond what we might traditionally imagine.

Synergetics is a modern-day example of how geometry forms the basis of the structure of creation, life, and how everything interacts with each other. Buckminster Fuller coined the term *synergetics* in his three-volume work "*Synergetics. Explorations in the Geometry of Thinking,*"[131] wherein he explains how using a 60° coordinates system can explain both physics and chemistry, but more importantly, he believed that it also explained reality. In his words:

> *Since physical Universe is entirely energetic, all dimension must be energetic. Synergetics is energetic geometry since it identifies energy with number. Energetic geometry employs 60° coordination because that is nature's way to closest-pack spheres.*

He explains how a tetrahedron's points and lines (60° coordinates) describe all elementary phenomena. Moreover, he claims that synergetics can measure our experiences geometrically and that we can employ geometry regarding both metaphysical and physical knowledge.

The math of synergetics, according to Fuller, "*works omnirationally, energetically, arithmetically, geometrically, chemically, volumetrically, crystallographically, vectorially, topologically, and energy-quantum-wise*" [132]. In addition, it is pretty compatible with the empirical world, where all atoms are made of tetrahedrons, octahedrons, rhombic dodecahedrons, and cubes. One clever Dublin School of Technology engineer hypothesizes that thermodynamics and space-time could be unified with quadray coordinates [133]. It is worth noting that each of the geometrical shapes that Fuller claims all atoms are made by can be made with the tetrahedron.



The thologram, which is based entirely on the tetrahedron and synergetic quadray coordinates, is a model of knowledge, thought, and ideas. It's important to remember that the map is not the territory. These models of reality are like maps that describe the terrain. There are elevation maps, density maps, road maps, water maps, contour maps, temperature maps, population maps, economy maps, and crime maps. San Francisco even has human feces maps! They all describe the same territory from different perspectives. The thologram is one of these perspectives, but even this one perspective can be seen in several ways. How many ways are there? I don't know, but the elementary *three-square geometry problem* ("what is the total of the angles α, β, γ ?") has 54 possible solutions, and that is just with three simple squares (the answer is 90°)! As you can imagine, there is virtually no end to the relationships, patterns, rules, etc., that can be discovered.

What separates knowledge from *apophenic* delusions ("apophenia" is the tendency to perceive connections and meaning between unrelated things and is considered a sign of early-stage schizophrenia) is whether a relationship, pattern or law can be tested to achieve predictable results. On the other hand, we don't want to fall victim to *randomania* either ("randomania" is the unofficial term for people who attribute to chance that which is clearly the result of order, the inability to see patterns where they actually exist. I suspect this disability is also a sign of some sort of mental illness).

> *It doesn't matter how beautiful your theory is; it doesn't matter how smart you are. If it doesn't agree with experiment, it's wrong.* ***~Richard Feynman***

We agree with Mr. Feynman, but we also have a broader definition of "experiment". Reality is reasonable by default; otherwise, it would not exist, but it is not always quantifiable and often incompatible with current science.

Types of archetypes

The 2D images of the "*Examples of contextual instances of a simple pattern*" (above) show a fundamental growth pattern so we might call this a *dynamic archetype*. The archetype of a circle is the perfect expression of the rule "the locus of all points are equidistant from a central point" might be called a *transcendental archetype* because it would take an infinite number of lines to make a perfect circle. The 5 Platonic solids (tetrahedron, cube, octahedron, dodecahedron, icosahedron) are *static archetypes* because they are defined by their faces and vertices only, not by any *process*. Jungian archetypes might be called *character archetypes* as they apply to the personification that tends to represent what Jung called a "primordial image". This understanding led Jung to the ideas of *anima/animus, the self, the shadow*, and *the persona* but also shed light on the classic archetypes such as *wise old man, the child, the mother, the maiden*, etc. This was later expanded to *Neo-Jungian* archetypes such as *care-giver, explorer, jester, rebel, citizen, hero, lover, sage, creator, innocent, magician,* and *sovereign*. Not surprisingly, these twelve archetypes are similar to those found in astrology. This is because Jung, who incorporated several alchemical and esoteric themes into his work, recognized astrology as a system of archetypes, adopting and reforming many of its concepts into modern psychology.

Everything, all of "that which is", has an archetype that exists in the grand ontology of all archetypes. We understand the world through these archetypes even though they do not represent the reality of the instance of these archetypes, the things themselves. If I say "apple", you understand what I mean, but "apple" says nothing about the reality of any individual apple. While this makes concepts easier to share and communicate about, it also hides much of the yet undiscovered reality of that concept. This is because we can only form concepts based on what we know, and what we know is always limited. It used to be common for things to have a "spirit", which was a concept of a general archetype of a thing that included more than its observable qualities. It was not only the idea of a perfect instance of some thing but also the energy of that instance. While the concept of "spirit" still exists today, it would be rare to hear science refer to the spirit of the apple because "spirit" has been removed from the modern Western ontological vernacular; it no longer exists in the hierarchical spectrum of "all that is", but only as a vague, undefined, poetic reference to a vague, undefined, poetic understanding of life. This is how language defines our perception of reality. A shaman may not know anything about the DNA of roses, but he may understand a lot about the spirit of roses. Who can claim to know more about the "truth" of the existence of roses? The scientist or the shaman? The answer depends on the context.

Tholonic instances are easier to understand when we look at isolated archetypes. It is easy to understand a square block is an expression of an archetypal cube, but what of a melting snowball? At what point does it stop being an expression of a sphere? From the tholonic perspective, never. The snowball came into existence as a result of many tholons (weather, terrain, gravity, etc.) cooperating and competing, exerting forces and limits in such a way that a snowball could form. The snowball changes form as these tholonic forces change due to waxing or waning circumstances that tend to reinforce some forces and diminish others. Each of these tholonic forces is an archetype because each tholon *is* an archetype. As these archetypal forces change, interact, negotiate, and compete, the resulting form will always be the most efficient expression of the state of those forces. In other words, everything that exists is as

perfect an expression of its archetypes as is possible in the context of its existence. Everything that exists is made up of many branches of tholons or archetypes, so what we see is an amalgamation of countless archetypes that have managed to create a stable instance in a specific context.

The melted snowball is still an expression of a perfect sphere, but just a very diluted or weak expression given the strength of the other forces that have turned it into a puddle. One way to think about this is to imagine each archetype as having a field of influence (which they do, and which is explained later) similar to the way each planet has a gravitational field or how each electron has an electron field, both of which stretching to the edge of the universe. Right now, you are primarily under the influence of Earth's gravitational field. You are also under the influence of Jupiter's gravitational field, but it is too weak to have any *observable* effect. If you were to move closer to Jupiter, its effect would become more apparent.

Imagine each archetype as having some level of entropy, similar to how the entropy of Earth's gravitational force is very low and the entropy of Jupiter's is very high (for us on Earth). Similarly, the archetypal force of a sphere is very low when the water is in the form of a snowball, but very high when it is a puddle.

Our snowball-turned-puddle is just less influenced by the "field" of the archetype of *sphere* and much more influenced by the "field" of the archetype of *puddle*. Each of these fields is defined by the archetype, which is a composite of the other archetypal forces that created it.

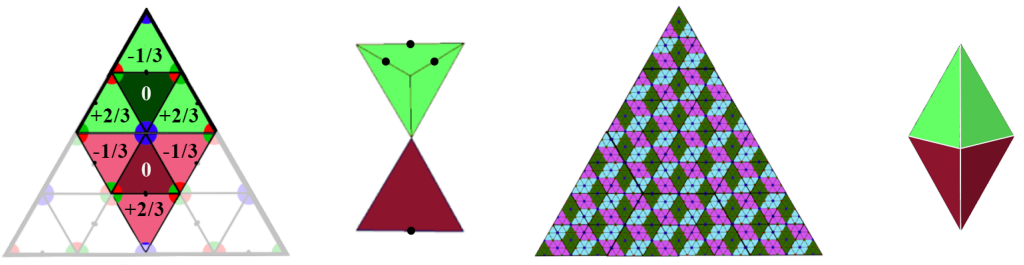
Some of these amalgamations of archetypes will become archetypes and parents of archetypes themselves. Perhaps the only pure, unamalgamated archetypes that exist are the concepts of *somethingness* and *nothingness*, or maybe 0 and 1.

So, when you see something that looks imperfect, think of it as perfect; it's just that you are not aware of all the archetypal forces that are making it the way it is.

Key 66: Everything that exists *must* be perfect.

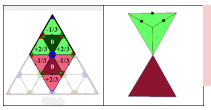
Examples of instances

Quarks



Here is another example of how we might discover tholonic structures in subatomic particles. Let's look at a quark (which was initially named a *parton* by Richard Feynman to describe a hypothetical particle inside the atom's nucleus).

Currently, we understand that protons have a charge of +1 and are composed of 2 *up* quarks, which have a charge of +2/3, and 1 down quark, which has a charge of -1/3, and neutrons have a charge of 0 and are composed of 1 up quark and 2 down quarks.



This is seen in a single complete tholon which consists of a *real* tholon (proton) and it *virtual* reflection tholon (neutron) as shown in ***Fig. q1*** and ***Fig. q1a*** below. The upper trigram has a parent trigram at the top, which we can assign a value of -1/3, and the two children can be assigned a value of +2/3. The center child trigram, which is always a reflection trigram, has a value of 0. The opposite is true for the lower reflection trigram as well. With these values, the upper tholon has a charge of 1, like a proton, and its reflection tholon has a charge of 0, like a neutron. This also seems to indicate that a truly complete tholon requires two tholons; itself and its reflection tholon. It's worth noting that the simplest element, hydrogen, is the only stable element that does not have a neutron (*heavy hydrogen*, or *deuterium*, has 1 neutron and is stable, and the radioactive *tritium* has 2 neutrons).

If you remember the x, y, z coordinates of a tetrahedron as shown in the previous chapter, you might remember that the 4th point of a tetrahedron, the *white dot*, has the coordinates of **0, 0**, $\frac{\sqrt{2}}{3} + \frac{\sqrt{2}}{3}$, the N-state was $\sqrt{3} - \frac{1}{\sqrt{3}}$, and the 2 points that creates a new N-state were $\frac{-1}{\sqrt{3}}$. Compare these to the charges of a proton of $\frac{-1}{3}, \frac{2}{3}, \frac{2}{3}$. The Cartesian coordinates of a *real* (as opposed to *virtual*) tetrahedron are proportional to the charges of a proton. Yes, this may simply be a "coincidence", or a property of *thirds*, or the result of some as yet unknown relationship, such as how the spiraling of galaxies, the female-to-male population in bee colonies, and the branching of the *sneezewort* plant are based on the same ratio of 1.618 (phi). Still, it is more reasonable to start with the idea that the tetrahedron, the conceptual building block of reality, and quarks, the actual building blocks of reality, follow the same rules.

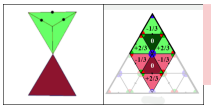
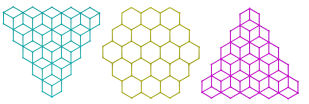


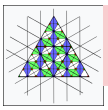
Fig. q1a, which is the folded 3D version of ***Fig. q1*** is also the same shape as the quartz *trans tridymite* silicon oxide molecule, with the N-states holding the same position as the silicon atom. For those playing along, note that the *trans tridymite* molecule has oxygen molecules that total the atomic number of 32 and the silicon molecules totaling 28, resulting in a total atomic number of 60.

Fig. q3 is from the previously quoted paper on the *E8 Lattice* that explains the various models within the E8 crystal and describes this shape as "representing all 8 components of the electron". This is not exactly the same as what we are saying here, but in a different order, which supports the overarching idea regarding tetrahedrons and subatomic particles.

Subatomics



To summarize, the foundation of all creation lies primarily in the 3 basic patterns created by the tholonic matrix. All 3 patterns are redundant, but only one (yellow hexagrams) is self-similar or fractal, and this is the only pattern that supports the N-states. For this reason, we assume that the yellow hex grid exists *between* the other two grids, and an N-state comes into existence *between* two poles.

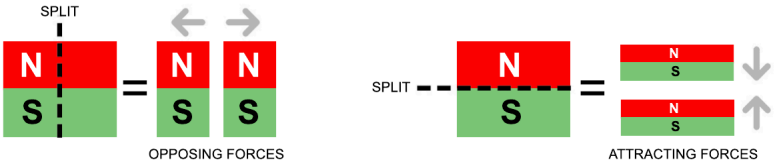


You'll notice that in ***Fig. h1*** (from the previous chapter), the lines of succession from N-sources to N-states exist across all 3 directions. We also saw 6 N-states in a complete (*virtual* and *real* together) tholon. If our tholonic quark model is in the ballpark, we would expect to see 6 classes, and we do. They are called "flavors", and they are: *up, down, strange, charm, bottom*, and *top*.

Neutrons *do* exist, which seems to go against the tholonic idea that the virtual tholons don't create anything, but remember, this thologram is a model of energy and relationships, not of form, so what we would expect to see is some *thing* that has zero energy… like a neutron. In fact, the neutron does have a charge even more powerful than the proton, but it is a charge made up of both positive and negative, thereby balancing it out to 0. And what holds all these subatomic particles together? The *strong nuclear force* (mainly), which is the strongest force in the Universe (10^{39} times more powerful than gravity) and the tholonic equivalent to, or represented by, the six integrated N-sources at the center of every hexagram.

In the thologram, all the NDC points are equidistantly separated from each other, meaning they all repel each other equally, except for the blue dots/N-states, which form strongly bonded clusters when forced together. We see this same quality in the *strong nuclear force* (SNF) which has a "weird" quality such that it only repels like-forces *after* they are separated. When these forces are close to one another, the SNF pulls them together! Physicists call this weirdness *asymptotic freedom* (and humans call it "divorce").

This "weirdness" is similar to when a magnet breaks in two along the polar axis (see image below). The two parts that were once one repel each other, that is, unless they reverse their orientation or *attitude* (as in the nautical meaning of the word, although it sounds like it should apply to human relationships as well). The specific mechanics of magnetism and the SNF may not be identical, but they seem to have a similar effect in different scopes.

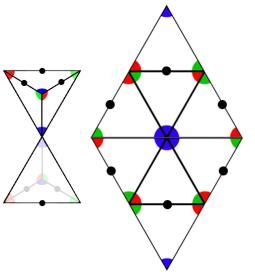


Most of what we have shown here involves how the movement of energy, in accordance with laws, brings form and, by extension, ideas, concepts, and archetypes into existence. Yet, almost nothing is said about the nature of the energy itself, other than that energy in its purest form is ultimately an expression of A&I. Here, we

have 6 N-sources that hold the tholons together to form the center of creation. In the quantum world, there is a similar concept of an energy that holds everything together, called *gluons*. Gluons are mass-less, absorbed, and emitted by quarks, and hold quarks together using the SNF. 8 types of gluons form the connections between quarks to create a proton, just as 8 types of trigrams form a tholonic model of a proton (4 *real* and 4 *virtual*).

Tholonically speaking, it is the laws described as geometry in the thologram that hold everything together. Is it reasonable to wonder if the other forces that hold things together, which are electromagnetism, the weak nuclear force, and gravity, are also represented geometrically somewhere in this infinite maze of tholonic patterns?

Understanding the tholonic nature of these forces may well give us an insight into the source of energy, which is to say, understanding the nature of the A&I that creates this reality.

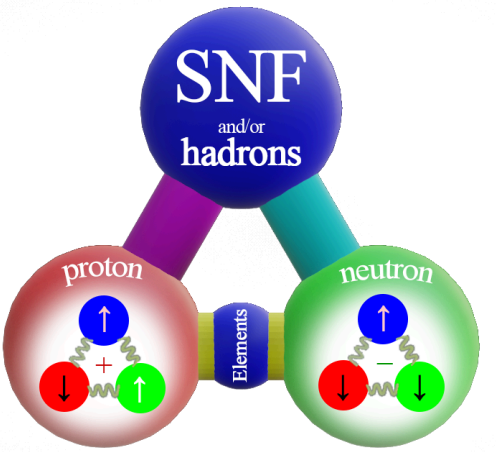


But what about the electron? Where is that? Tholonically speaking, the electron is a product of the imbalance of the parent tholon, which instantiates as a proton and has a total charge of +1. Therefore, the parent tholon will naturally create an equal and opposite tholon that instantiates as an electron with a charge of -1. Where would this electron exist? At the opposite side of the N-sources across the scope or spectrum defined by the children C and D, which is where N-states manifest as stable expressions. In a 2D tholon map, this location is the outermost edge of the hexagram, and in 2 3D tholon, it is the outermost exposed edges (image right).

As these N-states are 0-dimensional concepts, then we would expect the strong nuclear force, the most powerful force in existence, to have no effect on them and indeed, electrons are unaffected by the SNF, just as the blue dots do not have any direct contact with the child N-state.

This seems contradictory, as we now use this same model to show that electrons will appear in-between the red and green balls, so does this mean that the SNF and electrons are similar in some way? No, because describing how the electron fits into this model and how the SNF fits are two distinct contexts and scopes.

Neutrons and protons are *hadrons*, and all *hadrons* are made of quarks. A neutron has 2 UP quarks and 1 DOWN quark, and a proton having 2 DOWN quarks, and 1 UP quark (*note: UP quarks are heavier that DOWN quarks, which is why neutrons weigh more that protons*). In the image on the right, you can see both the proton and the neutron as their component quarks. Here we can see the same model applies but in a different context. An electron is not the product of a proton and neutron; elements are their product. Its more the product of a neutron, as neutrons decay into electrons, and in the model of the neutron, it would appear between the 2 DOWN quarks.



Applying the 2D tholon maps in the context of the SNF, we see that the SNF instantiates only when protons and neutrons are connected. As the protons and neutrons can never actually touch, those 6 N-state clusters in the center of the hexagons would look like 6 separate N-states , rather than 6 joined N-states . (What about the virtual tholons in this larger context? Do they instantiate as anti-matter?).

If the tholonic model repeats itself at every level, this means that everything that exists is somehow based on a self-similar trigram, conceptually at least, but the underlying point is that the thologram, or any model of reality, is that is one perspective of a much greater multidimensional model. Being multidimensional, it can be perceived in many ways. All models, including those of our ancestors that lived in the wild and in a world dominated by spirits, plants, insects, predators, and gods, were built on the same concepts that were adapted to their context.

There's another pattern that we see in the quarks that gives some insight into the nature of patterns.

While there are 6 types of quarks arbitrarily (for the most part) and whimsically named UP, DOWN, CHARM, STRANGE, BEAUTY, and TRUTH. While there there us surely some pattern of the 6 quark types to the thologram, proton and neutron are only composed of UP and DOWN quarks, so we will just look at these.

The 3 quarks that create a proton are UP-UP-DOWN, and the 3 that create a neutron are DOWN-DOWN-UP. While there are particles that are composed of 3 UP and 3 DOWN quarks (*delta baryons*), they are extremely unstable and imbalanced and only exist for ~5.63×10^{-24} seconds. If we were to assign UP=0 and DOWN=1, we see that the 8 possible combinations of 3 quarks as 000, 001, 010, 011, 100, 101, 110, 111, which are also the binary values of the numbers 0, 1, 2, 3, 4, 5, 6, 8.

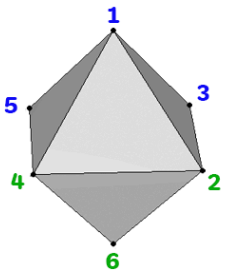
Because there is no significance to the order of quarks, DUU is the same as UDU and UUD, and UDD is the same as DUD and DDU. We are only interested in the quantity of 1s and 0s in any triplet, not their order. This results in 4 types of groupings [000], [001,010,100], [011,101,110], [111]. In decimal value these are [0], [1,2,4], [3,5,6], [7]. As any member of each group can represent the entire group, we can use the smallest value of each group to represent that group, giving us 4 values of [0,1,3,7] to represent all possible groupings of 3 quarks.

Group	Type	Members	Binary	Decimal	Lifespan
0	delta baryons	[DDD]	[111]	[7]	5.63×10^{-24} seconds
1	neutrons	[DDU,DUD,UDD]	[110,101,011]	[6,5,3]	~15 minutes
3	protons	[UUD,UDU,DUU	[001,010,100]	[1,2,4]	10^{34} years
7	delta baryons	[UUU]	[000]	[0]	5.63×10^{-24} seconds

0 and 7 represent the limits of this duality. In between 0 and 7 is where the protons (DUU, DUD, DDU) and neutrons (DDU, DUD, DUU) that make up our stable reality exist. Protons are amazingly stable, so stable they will theoretically far outlast the life of the Universe. Neutrons are only stable enough to last about 15 minutes on their own, which is respectable compared to the lifespan of most particles, but when bound to a proton, they can last billions of years.

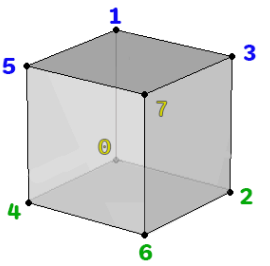
Protons are clearly the dominant pattern not only because of their stability but because the members of the proton group follow a binary patter of 1, 2, 4.

Let's look again at the image from the previous chapters that was used to explore the directions and shapes of the 3 most fundamental archetypal forms.



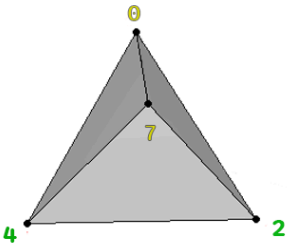
Octahedron

coords	*bin*	*dec*	
0,0,2	001	1	
0,2,0	010	2	
2,0,0	100	4	
0,0,2	001	6	(7-1)
0,2,0	010	5	(7-2)
2,0,0	100	3	(7-4)



Cube

coords	*bin*	*dec*
1,1,1	000	0
1,1,1	001	1
1,1,1	010	2
1,1,1	011	3
1,1,1	100	4
1,1,1	101	5
1,1,1	110	6
1,1,1	111	7

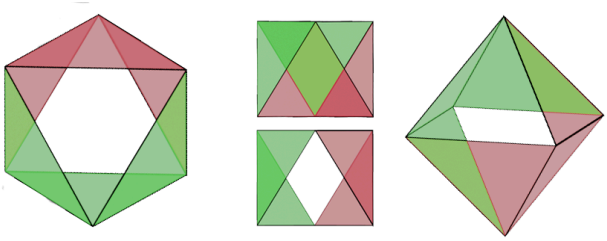


Tetrahedron

coords	*bin*	*dec*
1,1,1	111	0
1,1,1	010	2
1,1,1	100	4
1,1,1	111	7

We can see the members of the groupings for protons (1,2,4) and neutrons (3,5,6) are identical to the values derived from the octahedron coordinates. This is a very fractal or self-similar pattern because the 8 sides of the octahedron match the 8 possible configurations of *triquark* particles (any particle composed of 3 quarks, such as protons

and neutrons, plus a bunch more). But more then that, we can equate the UP and DOWN quarks to ODD and EVEN values of the octahedron. When we do, we can see that in the cube, the pattern 1,2,4 and 7 defines the 4 points of a tetrahedron, which are also the 4 of the 8 points of a cube, and the neutron group of 3,5,6 and 0 defines another opposite tetrahedron that defines the remaining 4 points of the cube. Without knowing anything about protons and neutrons, the tholonic model would predict that the 1,2,4+7 tetrahedron, or tholon, would instantiate as something much more on the *somethingness* side, the *yang* side, of the spectrum, and the 3,5,6+0 would instantiate on the *nothingness* side, or *yin* side, of the spectrum, and we can see these characteristics clearly in protons and neutrons. If we identify which sides of the octahedron are values that match the proton group (red) and which match the neutron group (green), it will look like the image below.



On first thought, it would seem that the proton (+) and the electron (-) would be the fundamental duality, but this does not appear to be the case. The duality is actually, and correctly, between *somethingness* (proton, +1) and *nothingness* (neutron, 0), within which a stable electron (-1) is formed.

Perhaps this is all “useless knowledge”, or maybe we can ignore these associations between quarks and geometry and write them off as the inevitable patterns of anything that has a pair of 3 polarities, such as 2 sets of 3 pennies or the additive/subtractive colors formed by the RGB and CMY, but it is precisely these patterns that we are interested in. Because of these patterns, we can relate quarks to shapes, shapes to colors, and quarks to colors. The later example is the basis for *quantum chromodynamics* (QDR). QDR uses colors to explain how the 3 fundamental forces that govern the SNF interact, which happens to be similar to how the 3 primary colors interact.

When the idea of colors was introduced to explain this SNF interaction, it was met with skepticism. To quote the man who invented the concept of quark *colors*, University of Maryland physicist, professor O. W. “Wally” Greenberg:

> *“My own work at the Institute for Advanced Study that led to the introduction of color charge in particle physics is an example of useless knowledge that turned out to generate something of considerable use…”*
>
> *“When I asked [Robert Oppenheimer] if he had read my paper [on color and quantum interactions], he said, “It’s beautiful.” I was elated. My elation was, however, short-lived, because Oppenheimer’s next statement was, “but I don’t believe a word of it.” At the time many physicists shared Oppenheimer’s disbelief.”* 134

And considerable it was, as today, *quantum chromodynamics* is fundamental to understanding how quarks, and reality, work.

Compare the 2-dimensional tholon map of (3 iterations of) overlapping tholons (below right) and a diagram of the current model of quarks as described using colors[135]. There are several similarities. This is not to say the thologram is a new model of quantum physics, simply that we can find similar patterns. The tholonic argument is that the quantum model is an instance of the thologram in the context of the quantum world, and even the colors used to describe them are a tholonic model in the context of frequencies of energies, in this case, light, but the same applies to all frequencies of the electromagnetic spectrum.

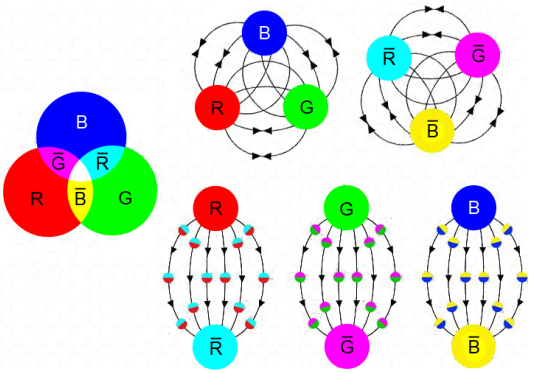


Fig. v1
Current model of combinations of quarks (RGB) and anti-quarks (CMY)

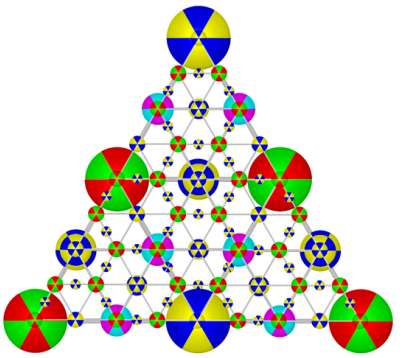


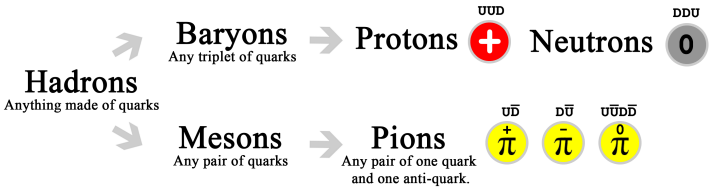
Fig. v2
One orthogonal perspective of the tholonic matrix of NDC properties as RGB and their interactions as CMY.
(3 generations and 3 interations)

A point on stability and balance

- It must be pointed out that *balanced* is not always the same as *stable*. Stability depends on structure and balance, but depending on the structure of something, there is a certain limit of tolerance for imbalance. For example, iron is imbalanced in that all the electrons spin in the same direction, which is what causes it to be magnetic. In contrast, in most other elements, half the electrons spin clockwise, and half spin counterclockwise, balancing each other out. However, iron is also quite stable because the *body-centered cubic* crystal it forms at the atomic level provides stability regardless of the imbalance of the electron spin. On a macro level, the more imbalance there is, the more structure is needed to compensate in order to remain sustainable. This tells us that while both stability and balance determine the sustainability of something, stability appears to have a higher priority. We also saw confirmation of this when it came to photosynthesis in plants (in *Chapter 5: Reason*).

Key 5: Stability trumps balance.

How does the thologram tell us something about quarks and forces? Perhaps. The SNF is the "largest" of all the forces in that it is the strongest force in existence, but only at the subatomic level. Outside of that context, it effectively doesn't exist as it's so weak, just as 7 is the largest value only with the context and scope of values 0-7. The other apparent relationship is that in this example, the N-state must have the potential for 6 quarks (UUUDDD), and we see in the thologram that the SNF only comes into existence when there are 6 N-States . For this reason, a single N-state is probably more like a *potential* SNF that needs other ingredients (hadrons?) necessary to instantiate.



Again, this is a good place to remind the reader that the tholonic model is not meant to be a model based on physics or even mechanics. It is a model that shows the patterns on which physics, mechanics, and everything else are based.

The 4 Fundamental Forces of Reality

We mentioned above that the first instance of matter would be tetrahedral, at least conceptually. The previous example of the quark model as two tetrahedrons is just that, and quarks form the hadrons from which all matter is composed, this claim holds true. We also stated that form, being an instantiation of the laws of form, would follow that model, meaning we should expect to see tetrahedral conceptual structures as a primary building block of reality. We can go all the way down to the four fundamental forces that control the 6 quarks and 6 leptons (and their 12 anti-particle pairs) that create every bit of matter and every phenomena in existence and see its tetrahedral structure, and even some other relationship between the forces that could possibly be tested. For example, if we apply the four forces in the same order as they came into creation (gravity, EM, strong force, weak force) and in the same order that they would appear in a tetrahedron, and we, we get the images below.

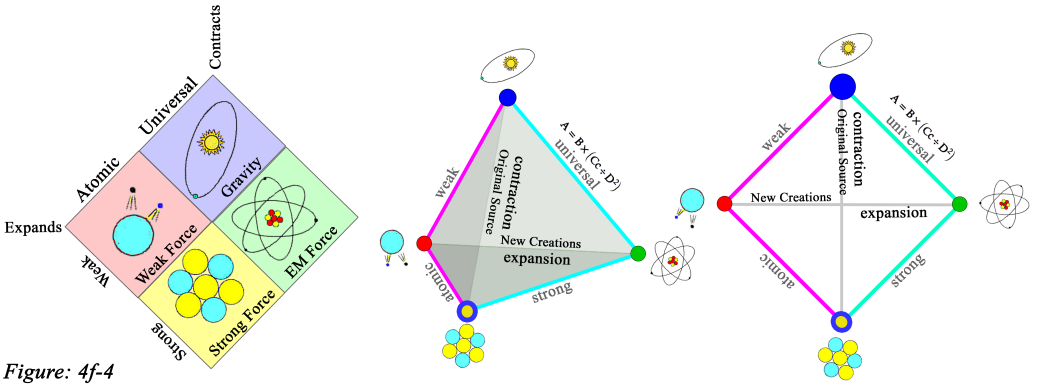


Figure: 4f-4

What is most interesting with this order is how we see the *N-source* and the *N-state* (blue dot and child blue/yellow dot), are represents by the two most dominant forces of the universal scale (*gravity*) and the atomic scale (*strong*) force (yes, EM has much more force then gravity, but EM tends to balance itself out in mass, thereby neutralizing itself, while gravity has no negative force, making gravity far more influential than EM on the universal scale). The blue-green vector is that of *Definition and Limitation*, and here we see the very definition of "Definition and Limitation"… a math formula that describes both ends of the vector, as both *gravity* and the *EM* force can both be described with the same formula pattern of $A = B\frac{Cc}{D^2}$; for gravitational force it's $F = G\frac{Mm}{r^2}$, and for EM force it's $F = k\frac{Qq}{r^2}$. This is yet another example of self-similar patterns applied to different contexts. We also see how the *weak* and the *strong* forces are perpendicular to one another, just as the *contracting* and *expanding* forces. In the same fashion, we see the spectrum across which new creations come in to being, which is along the *expansion* dimension, is also perpendicular to the constant continuity and contraction of the *N-sources/states*, which has its origin in the first creation, and which is recreated in every generation that follows. This particular model also suggests that gravity is the source of creation, which is consistent with the idea that gravity is a material instance of consciousness, which is an instance of awareness, which is, according to the tholonic model, the source of creation. In this case, gravity is the first force because it was the first to come into existence.

However, if we change the order based on some other reasoning, we get a very different set of relationships. Which one is the most "accurate" is anyone's guess at this point, but I suspect they are all "accurate" from one or another perspective. The image below starts with an *N-source* of gravity, but considers the N-state as the "child" of the N-source, and given that the EM force has the same formula pattern as gravity, EM is placed in position 4, which them results in the *strong* force and the *weak* force. This is contrary to what we know to be the actual order, but this pattern is still reasonable if we don't constrain ourself to 3D spacetime linear causality (i.e., every effect must have a preceding cause) which we can easily do in anything more that 3 dimensions.

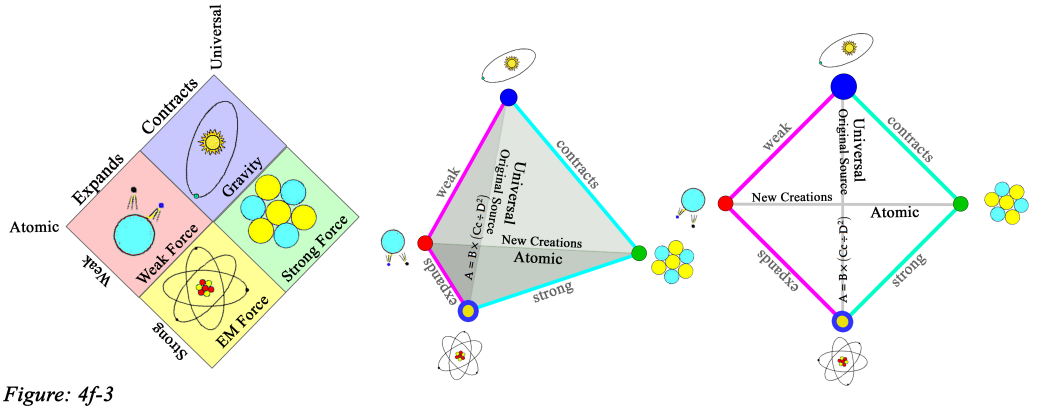
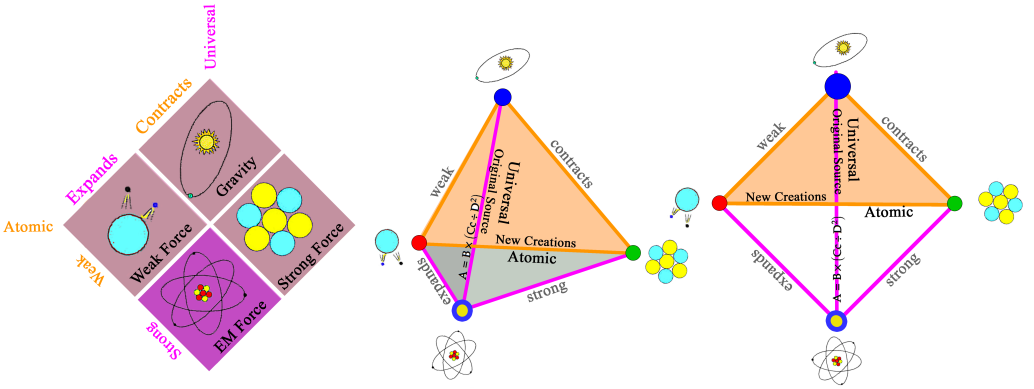


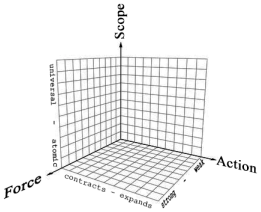
Figure: 4f-3

There is another, if not strictly scientific, pattern here, and that is how these four forces can be defined by 3 pairs of attributes; scope (atomic/universal), actions (contraction/expansion), and force (weak/strong). Each pair is also quite clearly an instance of the concepts of yin and yang. If we were to look at this same diagram (***Fig. 4f-3***) from this perspective of 3 pairs of yin/yang, it woudl look like this:



With 3 pairs of attributes, we can also easily map these 4 fundamental forces of nature to a 3D graph as well as to the 3 fundamental attributes forces of electricity, Newton's 2nd law, and, as shown previously, relativity, quantum mechanics, fluid dynamics, and much more, as well be shown. Here, orange represents *yin* and violet represents *yang*. The colors of the (left) boxes are determined by mixing their portions of *yin* and *yang* colors. For example, *EM force* is a point at the end of 3 *yang* connecting lines, so it is solid violet, while all the other points are a combination or 2 orange lines and 1 violet line, resulting in a dark-peachy color.

Yin	Yang	Concept	Description	Equivalence	Electricity	Newton's 2nd
Atomic	Universal	Scope	Context of force and action	Contextual limitation (resistance)	R	mass
Contracts	Expands	Action	Application of force and action	Current	I	acceleration
Weak	Strong	Force	Effect of action within scope	Force	V	force

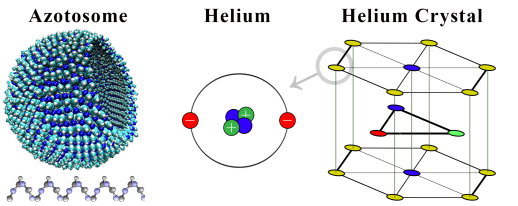


This point of this is to show how the tetrahedral pattern appears at every level of creations. I feel I must stress this as I can already hear physicists and engineers balking at these correlations. That being said, I will go further and say that these 3 axis of action, scope, and force correlate extremely will with the tholonic concepts of *Negotiation/balance*, *Definition/limitation*, and *Contribution/Integration*.

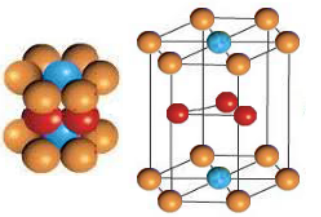
Molecules

What about the world of elements and molecules?

The 1st instance of matter in the Newtonian sense (vs. the quantum sense) are the elements. While all elements have some type of trigram structure, no element has a tetrahedral structure when it is isolated. The bonds *between* the atomic elements create the tetrahedral structure. We can see how elements are acting like instances of a 2D trigram, even though they are expressions of a 3D tholon, which suggests that elements are the first material instances of a tholon or are acting like a bridge between a tholon map (2D), and a tholon (3D). In the tholon model, the individual elements exist at the 1st level of the thologram, which are the 1st tholons created by the folding of the 2D "map" and are shown as the numerous and small tetrahedrons upon which ever-larger tetrahedral structures emerge. That means we will not see actual tetrahedrons on this level, but we will see the same tholonic properties, such as form seeking the most stable state. We don't see tetrahedral forms in 3D structures until the 1st iteration. A single H_2O molecule is not a tetrahedron in form because it only has 3 atoms, so it is a trigram. Water, however, is tetrahedral.



Water is a particularly good substance for exploring tholonic structures because it is one of the first, if not *the* first, tetrahedral structures that all life depends upon. Another early structure that is tetrahedral as a molecule alone is methane, one of the first organic molecules and not just a building block of life on Earth, but quite possibly the basis for an entirely different form of life, as pictured in the *Azotosome* above, and one we might discover on the Saturn moon of Titan.



It's worth noting that the very original atom to come into existence was not hydrogen, but helium, with 2 protons, 2 neutrons, and 2 electrons, as helium is the 1st *noble* gas, meaning it is perfectly balanced energetically, and therefore less vulnerable to the wild energies flying around after the Big Bang. Helium also forms a hexagonal crystal, so the helium crystal is (probably) the original form to come into existence in the Universe (image right). Also significant is that the 1st creation of matter, as atoms, started with 2 protons, not 1.

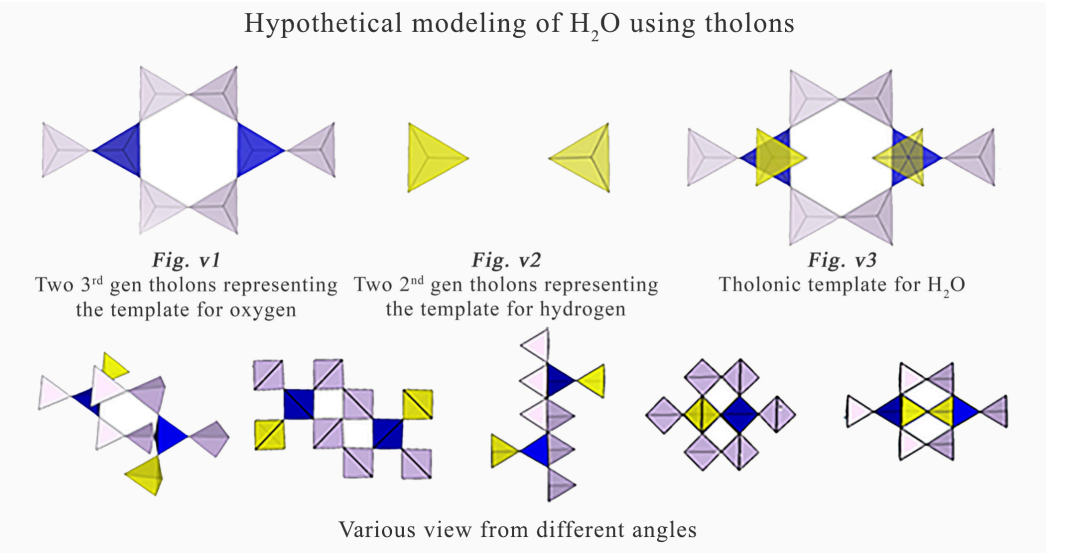
Getting back to water, we saw that in the 1st generation of a tholon, we have 4 trigrams, 3 of which are descending, or downward-pointing trigrams, and 1 is ascending, or upward-pointing trigram ("up" and "down" have only relative meaning here as it simply refers to the way the trigrams were drawn). If we have 2 tholons, we also have a total of 8 trigrams made up of 6 descending and 2 ascending trigrams.

H_2O is composed of three atoms. One atom is oxygen, which has an atomic number of 8 as it has 8 protons in its nucleus, which defines how much energy it holds as a "charge". It also supports 8 electrons in its outermost shell, representing its most balanced state. The other two atoms are hydrogen, the archetype of all atoms. Hydrogen has an atomic number of 1 and has only 1 proton and 1 electron. Although oxygen wants 8 electrons in its outer shell, it only has 6, so it naturally forms a bond with two hydrogen atoms by sharing the one electron each hydrogen has to offer.

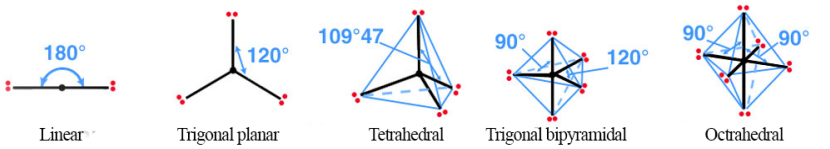
From a tholonic perspective, oxygen follows the pattern of 2 3rd gen tholons from 1 face of a 2nd gen tholon, which has 6 *real* tholons and 2 *virtual* tholons (***Fig. v1*** below, showing two 3rd gen tholons). Hydrogen follows the pattern of a complete 2nd gen tholon (***Fig. v2***, showing 2 complete 2nd gen tholons). Combining these 3 tholons (***Fig. v3***) would represent 8 externally-facing points (from the *real* tholons) of interaction and two internally facing points (from the *virtual* tholons) of non-interaction. When combined, the hydrogen tholons will attach to the empty or *virtual* tholons of oxygen.

We can see a few similarities between the tholonic model of *H_2O* and its traditional chemical model.

Tholon	***Atoms***	***H2O molecule***
8 points of interaction represented by the 8 real tholons	**Oxygen has charge of 8 and supports 8 electrons in outer shell for interactions with its surroundings.**	
2 points of non-interaction represented by the 2 virtual tholons	**Oxygen has 2 vacancies in the outer shell** *(also has 2 electrons filling the inner shell which do not interact with its surroundings)*	
Total of 10 tholons		**Total atomic charge of 10**
Integration of 2 tholon types	**Integration of 2 atom types.**	
3rd gen tholon structure 4x larger (in count) than 2nd gen structure	**3rd gen structure (O) is 42x larger (mass) than 2nd gen structure (H)**	



This is just a hypothetical demonstration, as there may be a much better tholonic model for elements and compounds than this one. Still, this one is sufficient to show how we might be able to describe elements and compounds tholonically, which may give us new insights into their nature.



Can we see this similar relationship with other compounds? Given that the basic archetypal shapes of molecules (shown above) can be represented within the thologram, perhaps this model can be applied to all compounds. We claim this might be possible, as there are almost infinite configurations in the thologram. Instances of fundamental configurations, such as those that appear in the earlier stages of iterations and generations, like the Fibonacci sequence and the hexagram, would represent extremely stable patterns. Therefore we expect to see them play a fundamental part in our reality (like water and methane) and could be easily discovered.

The Fibonacci formula is especially tholonic. For details, see "*Fibonacci Tholon*" in Appendix C, "*Tholonic Math*".

Batteries

An example of how any system can be reduced to a tholon is presented in an insightful article on the effectiveness of batteries, titled "The Unfortunate Tetrahedron" [136]. This may seem fairly niche, but it turns out to be very relevant, which is not surprising considering that batteries are all about the movement and balancing of energy. From this perspective, a simple battery is a microcosm of the Universe from beginning to end. In this article, the author shows how the systems of a simple battery can be

modeled as a tetrahedron and how these fundamental aspects of a system relate to one another. The author looks at the four aspects of batteries; *energy density*, *power density*, *operating cost* and *capital cost*, where:

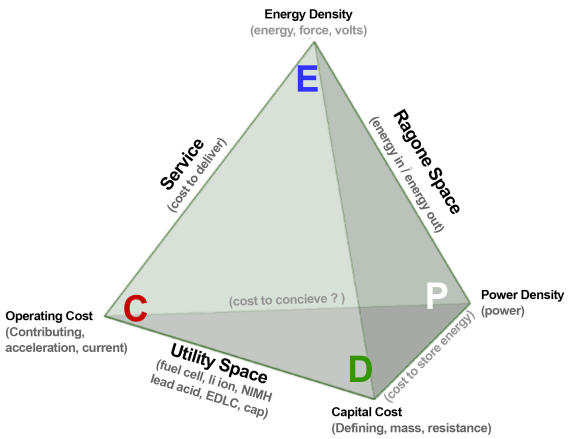
- **Energy density** (E) is how much energy a battery can store in its mass (like a dam). This is the *N-source* as the energy density is the maximum potential of a battery's usability, and energy is the whole point of a battery. This can also equate to *volts* given that volts, N-sources, and energy density all represent the *potential* of energy.

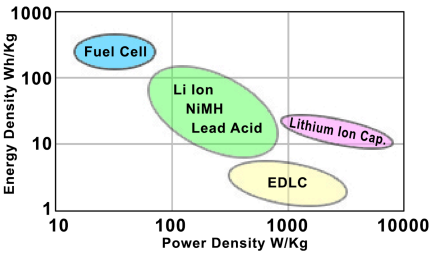
- **Capital cost** (C) is the cost of the battery. This is a *defining* point because it is a point of *resistance*. The cost will determine if it gets bought.

- **Operating cost** (O) is the cost to recharge the battery and the costs associated with keeping it safe and properly disposed of. This is the *Contributing* point because this defines how the battery will integrate into the environment (of its use). This can also equate to *current* and *acceleration* as operating costs represent a consistent application of effort.

- **Power density** (P) is how much energy it can deliver relative to its mass (like the turbines in a dam). This is the *white dot*, *power*, or the amount of energy the battery can deliver over how much time.

With this ordering, we can build a tholon for "batteries".





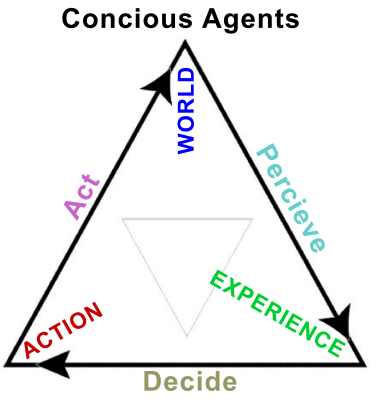
The article describes the relationship between **E** (energy density) and **P** (power density), which is equivalent to an *N-source* and a *defining* point that can be described in a *Ragone Space*. The Ragone plot (right) measures the performance comparison of various energy-storing devices. This chart is a perfect example of the axis of "laws, rules and limits" that connects an *N-space* with a *defining* point in the model of the tholon.

On the opposite side, between **C** (capital cost) and **E** (energy density), which is equivalent to a *contributing* point and an *N-source*, we have the tholonic axis of "service", which is pretty clear; does the battery provide a service? Remember that the descriptions of "laws" and "service" were specifically meant to apply to concepts of *Definition* and *Contribution* in the context of our daily lives.

According to the tholonic model, the only place where stable patterns capable of replication can occur is between the limitations of *Definition* and the integration of an instance (form) as *Contribution*, which here is **D** (capital costs) and **C** (operating cost). Across this spectrum of "cooperation or conflict" is where price and value come to terms with each other, as in "getting the most for your money". In the battery world (and many other worlds as well), this is the juggling act between good, cheap, and fast, and the arena which produces all the various instances of batteries that can deliver power at a cost, most of the instances landing in the "middle", representing the best product for the best price for a specific market. Here would appear instances like alkaline cell batteries (Duracell), lead-acid batteries (car batteries), nickel-cadmium batteries (rechargeable batteries), etc. Each of these new instances (stable patterns) can then go on to create their own tholonic archetypes.

Consciousness

The highly respected and published team of Donald David Hoffman (cognitive psychologist, author, and Professor in the Department of Cognitive Sciences at the University of California, Irvine) and Chetan Prakash (Ph.D. Mathematical Physics, Cornell University) developed the idea of a *conscious agent*, which is a dynamic process of consciousness and argued that it is the interaction between various agents that produce measurable phenomena such as the position, momentum, and energy of objects. They further argue that these objects have no objective, absolute, or even preexisting properties and only exist in relation to consciousness via these *conscious agents*. This is a radical claim, but their arguments and evidence, as laid out in their paper "*Objects of consciousness*" [137], can't be ignored. What also can't be ignored is the striking similarity between their model and the tholonic model, as shown below. (This was also especially striking for me as I learned of this long after the 1st draft of this book. Of course, they do a far better job of explaining their idea technically, mathematically, and psychologically.)



Circuits and the "God Formula"

There are many examples of how concepts and processes follow the tholonic model:

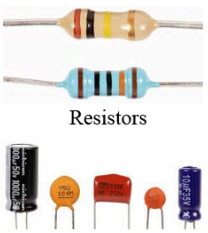
- **Complexity economics** asks "how individual behaviors in a situation might react to the pattern they together create, and how that pattern would alter itself, causing new reactions" [138].
- **Calculus**, with its concepts of *differentiation* and *integration* that join to create a new value.
- **The stock exchange**, with opposing forces negotiating to arrive at a price.
- **Faith and belief** in how it integrates the existential trinity of *all*, *all that is possible*, and *all that is*, or trinity of knowledge; the *known known*, *known unknown* and the *unknown unknown*.

Really, just about any ordered system can be seen from a tholonic perspective. The following are especially interesting and informative examples.

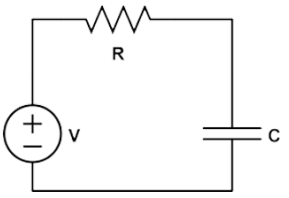
Electronic circuits are exciting and relevant to the tholonic model. One of the most common and essential circuits in electrical systems is the elementary *resistor-capacitor circuit*, or *RC circuit*. It is used to filter and control signals not only in manufactured electrical circuits but in natural electrical circuits, such as neurotransmission in the brain and throughout the entire nervous system of any living organism. The reader has undoubtedly seen such circuits as they exist in every computer system, alarm clock, microwave, and virtually all electronic devices.

Briefly, an electrical **resistor** is a component that can reduce the flow of current, adjust signal levels, divide voltages, and limit or control the current of a circuit in some way. A **capacitor** is a device that stores electrical energy in an electric field. In one way, a capacitor is like a battery in that it can store energy, but unlike a battery, it has no charge of its own but can store a charge from an external source. Air alone acts like a capacitor and is often used in radio circuits.

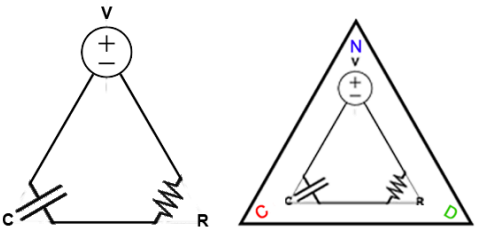
Let's look at a simple RC circuit.



Capacitors



Basic RC Circuit



Alternate Views of RC Circuit

We have 2 essential elements in this circuit; an element that limits and divides and an element that collects and stores. These concepts are perfectly in line with the basic concepts of *Definition/limitation* and *Contribution/integration* as shown in the *Alternate View* above.

How can we validate this similarity? Let's look at the following:

- The N-state acts as both the energy's source and destination. This would represent both ends of a battery, or a charge and a ground.

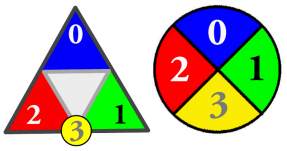
- The capacitor returns the energy to the destination, and the resistor imposes restrictions on the source.

- Voltage originates in the N-state in this example, which is also the case when we assign electrical properties to the tholon, as we did in the section on Ohm's law, so there is consistency.

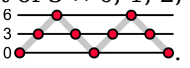
- The output of an RC circuit is a wave that has a unique form showing an exponential growth followed by an exponential drop, . While the details of the form can change depending on the components, it always has the same characteristics of a sharp ascending and descending. The interesting thing about this waveform is that it can be perfectly recreated by quadrants of a circle. Of course, just because two things have the same shape doesn't mean they share anything else than the shape, but in this case, it appears they share more. At the least, if the RC circuit *is* an instance of a tholonic trigram, then we would expect to see its output have some relationship to the thologram… and we do.

  Note: The lowercase "n" represents a new child N-state that results from the children of the parent N-source.

  In the image to the right, we have divided this hypothetical circle into 4 quadrants and numbered them tholonically, which means we use the *spatially* sequential values 0,1,3,2 (the *temporal* sequence is 0,1,2,3 because 3 can only come into existence *after* 1 and 2, but once 3 exists, it does so in-between 1 and 2) of the 4 points of a tholon. By assigning these colors to those quadrants where 0=blue (parent N-state), 1=green (*Limitation*), 2=red (*Contribution*), and 3=yellow (child *n*-state), we find the same characteristics and patterns we see in the thologram, specifically, the 2D tholon map. For example, the image below shows the output of an RC circuit as a result of the overlapping circles we just described.



    - We see only the N-States (yellow and blue) overlap on their own color and alternate between parent→child→parent→child, etc., as we would expect.
    - The D (green) and C (red) alternate in direction and pair up, and in doing so, create a new child *n*-state (yellow).
    - No square has a piece of N (blue). It is either all N (blue), all *n* (yellow), or DC*n* (red-green-yellow).
    - Every quadrant that is not exclusively an N-state contains all the other attributes (red, green, yellow), which alternate only along the path of the *lineage* (parent→child).
    - Each circle in the row is alternately flipped on both the N*n* (blue-yellow) axis of parent-child N-states and the across DC (red-green) axis.

- The direction of the overlaps is the same as the path of the lineage in the tholon.
- The overlapping values are a product of 3 × 0, 1, 2, and in an order that creates a continuous oscillation 

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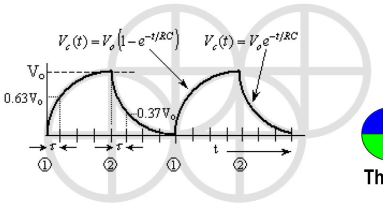
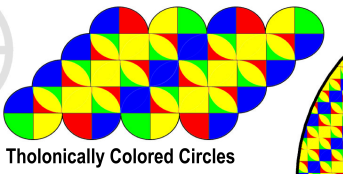
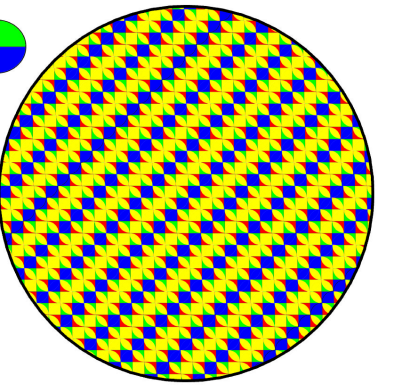
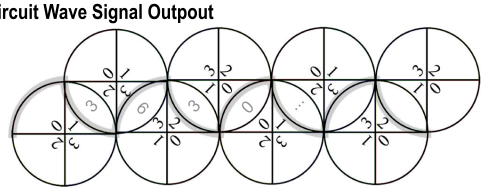


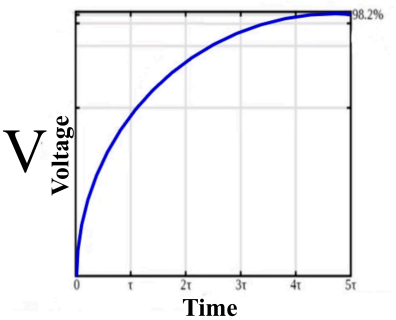
RC Circuit Wave Signal Outpout

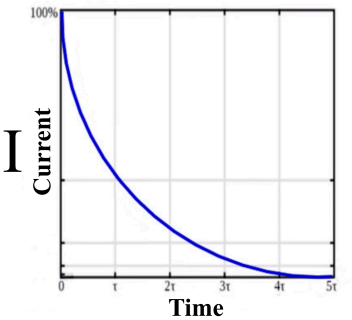

Tholonically Colored Circles


Repeated Circle Pattern


Numbered and Extended Virtual Circles

- In the tholon, the field in which the *n*-state can be created exists between D and C. Here, that field is defined by *R* and *C*, which creates a field of *time*. In electronics, it is called the *time constant* and is written as **τ = *RC*** (where **τ** is the Greek *tau* representing the *time constant*) and proves that the voltage (*V*) and the current (*I*) are always inverse to one another at any moment in time and increase/decrease as a function of time.





This *time constant* is then used to calculate *V* and *I* using the formulas $V(\tau)=V_B(I-e^{-\tau/RC})$ and $I(\tau)=I_0(e^{-\tau/RC})$. The point here is not to get into the math but to show not only that *V* and *I* relate to each other via *R* and *C*, and by extension, *D* and *C*, but that they do so across a field that in the world of electronics is defined by ***e***, or 2.7182, the number of the *natural log*. This is especially interesting when applying the properties of this RC field to that of the DC field of the tholon because ***e*** is one of the most profound and fascinating numbers in nature!

*Historical note: Although the value of **e** was discovered by Bernoulli in 1618, the appearance of **e** as the symbol for this value was in an unpublished paper by Euler in 1728 on the explosive forces in cannons.*

It is similar to *pi* in its significance, but where *pi* is the ratio between circumference and diameter shared by all circles, ***e*** is the base **rate of growth shared by all continually growing processes**. It has also been called the **epitome of universal**

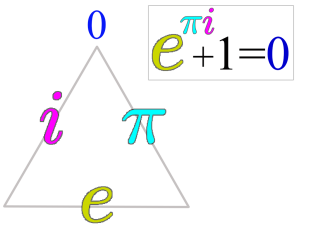
growth. This growth can be anything; population, radioactive decay, interest calculations, even jagged or unpredictable systems that don't grow smoothly. Anything that has continuous growth can be modeled with ***e***. ***e*** is to growth what the radius is to the circle.

e and the *Natural Log*, or *ln()*, are two sides of the same concept as ***e***, and the Natural Log are inverse or opposite one another, so *ln(e)=1*. ***e*** describes **growth**, and Natural Log describes **time**. For example:

- e^x is the amount we have after starting at 1.0 and growing continuously for ***x*** units of time, so e^x lets us **plug in time and get growth**.
- ***ln(x)*** (Natural Logarithm) is the time it will take to reach amount ***x***, so ***ln(x)*** lets us **plug in growth and get the time** it would take.

If you remember back in chapter 3, it was shown how logarithms were the natural way nature understands scale or scope, and while *common logs* are based on 10, the *natural log*, ***e***, is so named because it is the only value where the inverse of *time* equals *growth*.

Considering that the tholon is a growth model, it seems particularly applicable that ***e*** would define the field from which new N-states spawn new tholons.



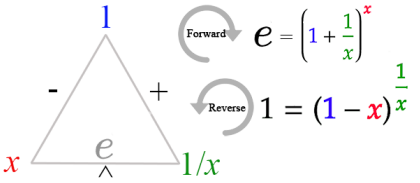
There is one more significance to ***e*** that is purely tholonic and will no doubt annoy math purists but is added here not only because of its symmetry but because the concepts that these values described *do* exist in the tholonic model, even if this particular form may not be the *exact* way they are best represented. As was just shown, the spectrum between *Definition* and *Contribution* is, in this context, defined by the value of ***e***. Referring back to how it was described that 1 point creates 2 points and 2 points create 3 points, when we created the 2nd point, we had a 1D line from *Negotiation* to *Definition*. However, we also had a center and a radius, thereby defining a circle. In this way, the 1st and 2nd points imply the relationship between a radius and a circle, which is *pi*, so if we were to assign a value to that 1D line, *pi* would be the best candidate. It was earlier suggested how the 3rd point represented complex numbers. If N=-1, then the CN line could reasonably be seen as ***i***, the imaginary value for the $\sqrt{-1}$.

If this tholonic trigram represents the three values of ***e***, *π*, and ***i***, we can construct Euler's Formula, or what has been called the most elegant formula in math, $e^{i\pi}+1=0$. This formula integrates all the dynamic connections between the points and the originating point into a beautiful concept. In addition, as ***e*** represents time and *pi* represents space, we have the two dimensions of time and space, plus the concept that describes the reality of cycles, that being complex numbers (which are necessary to add cycles that are different, for example).

What would be the value of the 4th point of the *white dot*? It's probably *time*, as none of these values have any significance without time, so perhaps the time constant can be applied to the 4th point, but this is just a guess.

This beautiful formula is fundamental to the continuous exchange of energy that we perceive as time (where 0 equals the present moment) and a bunch of other basic ideas of reality. This formula is so fundamental it has not only been called the **God Formula**, it has been presented as empirical proof of the existence of god. We are not that ambitious, pious, or learned and simply call it a fundamental archetypal pattern. If $e^{i\pi}$=-1 then *ln(-1)*=πi and we apply the concepts of of ***e*** and ***ln( )***, as described above, then πi equates to time, and the spectrum of ***e*** represents the growth. Does this also suggest that the originating energy of everything, including the Universe, started with a negative movement? There is more evidence to suggest that is the case, and later it is shown why and what that really means.

There is yet another supporting argument for ***e***, which we can see when we map the original formula for ***e*** that was discovered by Bernoulli in the 17th century (right) to the tholonic trigram, which shows a remarkably compatible pattern.



If we go in the forward direction using the three values of 1, $\frac{1}{x}$ and *x*, we arrive at ***e***, the value of *growth*. If we go in the reverse direction, we arrive at 1, the value of unity (and no growth). What is so interesting about this is that the N-state is 1, as in not 0, not *nothing*, representative of *something*. The *Definition* point, the point of resistance and limitation, or low entropy chaos, is $\frac{1}{x}$, or *something that is limited*. The final *Contribution* point, the point of the *integration*, the final state of balance, high entropy chaos, is ***x***. We could easily translate the math to say:

> *Unity, plus the chaos of its infinite divisions, creates new systems on its way to its final state of total balance.*

The Bigger Picture

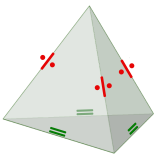


Fig. g1

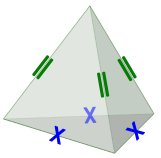


Fig. g2

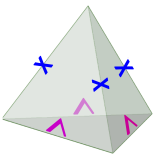


Fig. g3

It may look like our math has taken some "liberties" using more exotic values to support the argument that there is a natural and fundamental pattern of order that can be seen in the tetrahedron, and there is probably a lot of patterns that can be applied with various numbers that make the same "sense". That would be partly true, as the tetrahedron contains all kinds of patterns that can be seen in nature and math, but some or more "in your face" than others. For example, when we used the numbers 6, 2, and 3 for our trigram corner points, we can see a pattern of division (***Fig. g1***) and a pattern of multiplication (***Fig. g2***). These are the same pattern for **+** and **-** as well. When we use ***e***, ***i***, and ***π***, we can see a pattern of multiplication and exponents (***Fig. g3***).

Each of these patterns represents different ways energy moves in a tholon and requires different types of values to function properly. The values of 6, 2, and 3 work with patterns **g1** and **g2**, but not in the same manner with pattern **g3**, which works with values ***e***, ***i***, and ***π***, but they support each other. For example, if we only use values of ***i*** for pattern **g1**, using the values of i^1, i^2, i^3, we get values of *i, -1, -i*, which perfectly comply with pattern **g1** as $\frac{i}{-1}$=*-i*, $\frac{i}{-i}$=*1*, and *i*×*-1*=*-1*. But this is a tetrahedron, so we need that 4th *white dot* point that needs to be a value that is fundamental to, and compatible with, all the other values. That would be i^0, which is 1 and the value that all these values are derived from. And with that, all the formulas work. If we continued with i^5, i^6, and so on, we would get the same values because no matter how many multiples of i are used, it can only result in *1, i, -1, or -i*, which is yet more validation of the tetrahedron model. This pattern also tells us that the cardinal values of the points on a trigram are the exponential values of 1 (at the top), then 2 and 3, with the 4th point as 0 *after* the tholonic trigram has created its 3 children and folded into a tetrahedron. So, while the instances of the pattern are different, the pattern where the types of functions are grouped by the base and side trigrams.

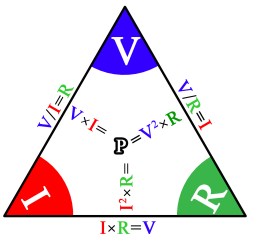
Back to Basics

Let's now map Newton's 2nd law (in the form of Ohm's law) to the tholon, which fits nicely.

To apply Ohm's law, we have to correlate the N, D, and C values to V, I, and R, like so:

- **N** (negotiation) as V (voltage, potential, and field of potential)
- **D** (definition) with R (resistance, opposition to free flow)
- **C** (contribution) with I (current, force of flow)

This allows us to state the following:



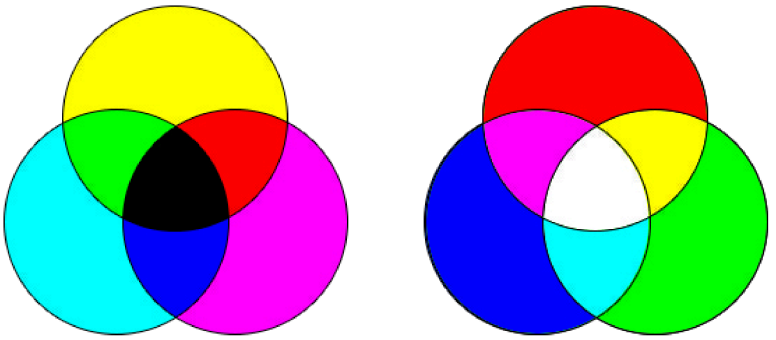
R=V÷I *becomes* Definition = Negotiation ÷ Contribution
I =V÷R *becomes* Contribution = Negotiation ÷ Definition
V=I×R *becomes* Negotiation = Contribution × Definition
P =V×I *becomes* Power = Negotiation × Contribution

We've taken a big leap here by applying math to such abstract concepts and expecting to see something meaningful, but if we look at these definitions as abstractions, they seem quite reasonable, just as they did to the founders of mathematics.

The (lost) Meaning of Math

To look closer, we need to make sure we're all on the same page regarding how the trigram can describe the math functions of Ohm's law, and to do that, we need to clarify some elementary concepts, such as what the math symbols mean in this context.

Addition and subtraction are easy concepts to grasp. We take some number of things and add or remove some number of things. But depending on the context, even simple addition and subtraction requires some extra thought. A good example of this is how addition and subtraction affect colors. It is not intuitive to most people that *violet - cyan = blue*, for example, but once shown, it makes sense.

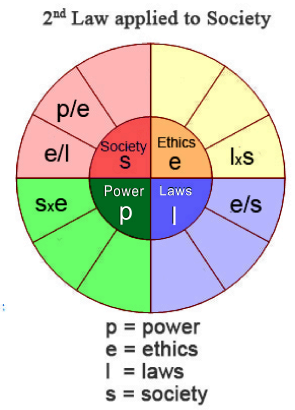


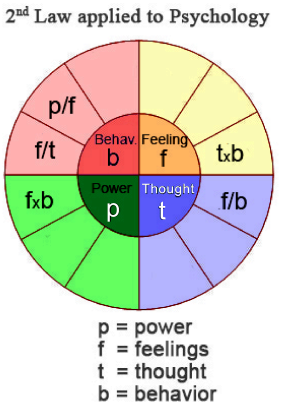
CMY
(Subtractive)

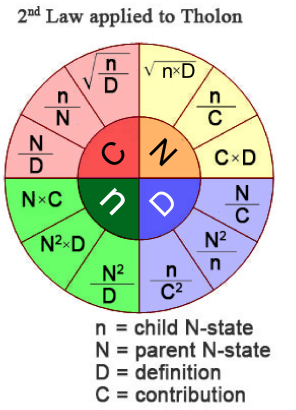
RGB
(Additive)

What about multiplication and division? In this context, we will describe division as *the definition of one value by the units of another value*. For example, in division, such as $3=\frac{12}{4}$, we are stating that 3 is what we get when we measure an existing value of 12 by a unit of 4. In multiplication, such as $12=3\times4$, we are determining a new value of 12 by combining 3 of these units-of-4. The 4, as the divisor or multiplier, is the *unit of measurement*, and the 3 is the *number of units*. Every kid knows what was stated, but when we apply those same simple rules and concepts to a non-math context, they become very significant. (For highly speculative thoughts on the meaning of squares and square roots, see *Meaning of Squares and Square Roots* in Appendix C, "Tholonic Math")

As mentioned above, we would expect to see the same laws expressed in different ways across all the scopes that the laws apply to, so we would expect to see an example of Newton's 2nd law in the tholonic realms of society, or planets, or organisms, and we do. For comparison, we also show how the attributes of the tholon would appear using the same laws.







For example, if we claim that a **society** is based on its **ethics** and we also posit that **ethics** are to be measured by **laws**, we can say ***society=ethics÷laws***, and likewise, ***ethics=laws* × *society***. Suppose we measure the **power** of a **society** by its ability to function or "**work**", and the measure of a **society** by its **sustainability**, then, according to these formulas. In that case, a **society** with a lot of **laws** and very little **ethics** will **work** less and be less **sustainable**. On the other hand, a **society** that has a lot of **ethics** and very few **laws** will be far more **sustainable** and produce even more **work**.

Here, we interpret "laws" as *limiting factors* with regard to its members. Those limits could even be limits on limits, e.g., The 1st amendment of the U.S. Constitution guaranteeing the right to free speech is a law, but it is a limitation on a limitation in that it limits the State from limiting an individual's right. For context, an example of a society with a lot of limiting laws and very little ethics would be North Korea or Syria. An example of a society with fewer limiting laws and higher ethics would be Norway or Sweden. *Note: These rankings are according to institutions that rank countries* [139]*and not necessarily the examples I would personally choose*.

If we claim that individuals interacting with each other (commerce, culture, aid, community) represents the strength of a society, then we might say this interaction correlates with *current*. If *ethics* represents the arena in which individuals operate, then we could correlate *ethics* with *voltage*. *Laws*, which define limits, would then reasonably be correlated to *resistance*. Altogether, individuals, ethics, and laws form a *society*.

We are effectively assigning the values of:

- 3 = ***interaction*** and equates to **current** (I) or **acceleration** (a)
- 6 = ***ethics*** and equates to **voltage** (V) or **force** (F)
- 2 = ***laws*** and equates to **resistance** (R) of **mass** (m)
- 18 = ***work*** and equates to **power** (P)

These are numbers that work with Newton's and Ohm's law, but in this context, the quantitative value of these numbers is not important. We are using the numbers to show relationships. The number itself is merely a concept of measure. Power, which is the transference of energy over time, would then correlate to how much "work"

this society could generate. Perhaps this would be seen in their social achievement, productivity, or levels of cooperation, but it could also represent a “work product” of oppression, taxation, or enslavement if that is the goal of the society.

How these assignments were arrived at is not critical because they may differ depending on how one chooses to correlate, so this detail does not matter for the point being made.

With these assignments, *society*=$\frac{ethics}{laws}$ follows the same reasoning as the formula as 3=$\frac{6}{2}$, so we can imagine different scenarios, for example:

- Case 1) *interaction* = $\frac{ethics}{laws} = \frac{6}{2} = 3$ ∴ work = 18
- Case 2) *interaction* = $\frac{ethics}{laws} = \frac{12}{2} = 6$ ∴ work = 72
- Case 3) *interaction* = $\frac{ethics}{laws} = \frac{6}{4} = 1.5$ ∴ work = 9

If this premise has any validity, this would suggest that a lot of laws and little ethics, or perhaps where the ethics are enforced by law rather than conscience, leads to an inefficient society. In contrast, a society with few laws and lots of ethics leads to a productive society.

How would we calculate *sustainability* then? Here is one way, perhaps, but this is totally outside the context of the law as we currently use it, so it will probably make no sense from an engineering perspective. In short, we simply take the product of all the unit-counts of *society* and measure it by the product of the unit-measures of *society*:

$$society = I = \frac{V}{R}\ or\ \frac{P}{V}\ or\ \sqrt{\frac{P}{R}} \therefore \frac{unit\ count}{unit\ measure} \therefore \frac{V \times P \times \sqrt{P}}{R \times V \times \sqrt{R}}$$

Applied to these 3 cases, we get the following:

- Case 1) $\frac{6}{2}\ or\ \frac{18}{6}\ or\ \sqrt{\frac{18}{2}} \therefore \frac{6 \times 18 \times \sqrt{18}}{2 \times 6 \times \sqrt{2}} \therefore \frac{458.2}{16.9} = 27.1$
- Case 1) $\frac{12}{2}\ or\ \frac{72}{12}\ or\ \sqrt{\frac{72}{2}} \therefore \frac{12 \times 72 \times \sqrt{72}}{2 \times 12 \times \sqrt{2}} \therefore \frac{7331.3}{33.9} = 216.3$
- Case 1) $\frac{6}{2}\ or\ \frac{9}{6}\ or\ \sqrt{\frac{9}{2}} \therefore \frac{6 \times 9 \times \sqrt{9}}{2 \times 6 \times \sqrt{2}} \therefore \frac{162}{16.9} = 9.5$

How these translate to the real world is only speculative, as it is up to the reader to decide if *laws*, *society*, *ethics*, and *work* are the best concepts to use here, and if so, how are the social equivalents of *power*, *ethics*, *laws*, *work*, and *sustainability* measured, as well as the significance of squares and square-roots.

How would this look if we used concepts such as *natural rights*, *privileges* and *responsibilities*?

This can apply to any properly defined trigram. For example, suppose we applied this same exercise to the cognitive behavioral trigram we mentioned previously. In that case, we might claim that *behavior* is a product of *thoughts* (one's own or those one is exposed to?) and that *thoughts* are to be measured by *feelings*; thus, *behavior* = *thoughts* ÷ *feelings* and *thoughts* = *behavior* × *feelings*. This would suggest that high *thought* with low *feeling* results in higher *behavior* and higher *power* (whatever that means in this context; intention? beliefs? desires? will?), while low *thought* and high *feelings* results in much lower *power* and even lower *behavior*.

I suspect it would take quite a bit of discussion and research to find the best values. The point of this is to suggest that these equations would produce meaningful results with the correct values. Still, someone who acts out of emotions with very little thought is bound to have a less sustainable lifestyle than one who tempers their emotions with thought, so these may not be too far off.

In any case, the twelve formulas of Newton's 2nd law shows some potential when applied to other contexts and may offer a new perspective on the dynamics of culture and society that, if nothing else, raises some worthwhile questions. As it applies here, it shows how the tholon can describe everything from atoms to culture as long as we know what data to apply. Because the math involved in a tholon can be more than the reader might be interested in, more of this subject is covered in *Appendix C, "Tholonic Math"*.

Because our 4D (3D+time) reality maps neatly into the 4D tetrahedron, especially when using the synergetic 4D quadray coordinate system based on the tetrahedron, we may be able to correlate radically different contexts, such as space-time, psychology, and electricity, to name a few.

With this in mind, let's reexamine the previous claims that began this thread:

Definition = Negotiation ÷ Contribution

The definition of something is its boundaries, limits, abilities, attributes, properties, and resources. These details are the results of the scope and context of that thing's instance. It could be environmental factors, genetic attributes, or physical limitations, such as the size and weight of a thing, energy levels, etc. It is the nature of energy to expand (i.e., disperse due to entropy) in every way possible. That expansion is the contribution, but the resistance from these factors determines what expansions get the opportunity to be expressed and what expansions are thwarted. That battle between the force of expansion and the force of resistance is the negotiation (*see Negotiation=Contribution × Definition*). As *Definition* is *Negotiation ÷ Contribution*, we can say that *Definition* is measured by that which is *Contributed*, or the *Definition* of something is determined by what it can (sustainably) *Contribute*.

Contribution = Negotiation ÷ Definition

What a thing can *Contribute* is measured by its *Definition*, but the degree to which it can contribute is determined by its environment and how it interacts with that environment. That interaction is a result of *Negotiation*. A thing must provide something that something in its environment needs; otherwise, what it has to contribute is useless and unintegratable.

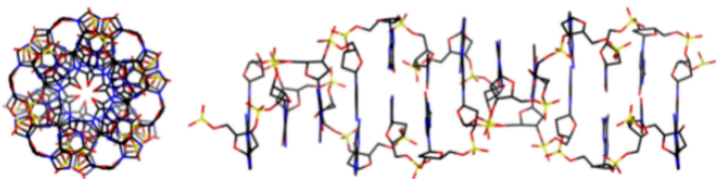
Negotiation = Contribution × Definition

A thing's ability to find a stable and sustainable position within its environment and scope is determined by the degree to which it can contribute with its current resources. A thing may have a *Definition* that gives it a lot of A and a little of B, but if its environment needs a lot of B and very little A, then it is B that the thing must *Contribute* to ensure its existence in that environment, or it needs to find another environment, or change its environment so that A is in more demand.

Applying different values and concepts can result in new data. We experiment with this a little, but given it is outside the central theme of this book, we have put that section under "New data?" in *Appendix C, "Tholonic Math"*

The shape of knowledge

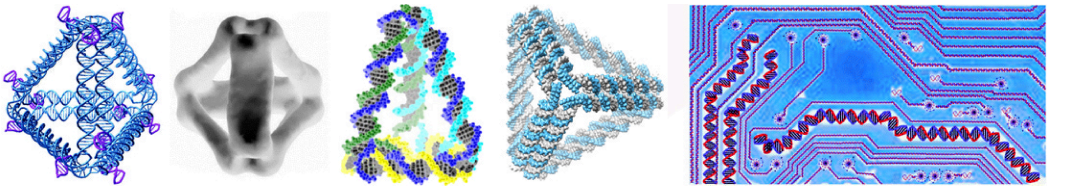
The point of all this is to show one way that the tholon can be used and viewed. There are many new ways of looking at energy in all its forms when viewed tholonically.



We showed examples of quarks and molecules, but in higher orders, such as DNA, we also see some striking similarities that, with a bit of investigation, would probably expose some stunning relationships.

DNA and how it is both tholonic and binary in nature is examined in the companion book "*The Tholonic I-Ching*".

DNA's relationship with tetrahedrons is particularly unique given the creation of tetrahedrally structured DNA (a. k. a. TDN). TDN is the cutting edge of DNA nanotechnology and has various applications such as drug delivery, inhibiting certain gene expressions, and of course, interfacing with bio-sensors. These TDNs assemble themselves from scratch and offer greater strength and stability than the ol' fashioned dual-strand DNA. Given that there is little accessible information on TDNs for the layperson, there is not much more that can be said here other than they look pretty awesome and will most likely be the origin of a new form of life powered by TDN-interfacing A.I. DNA-integrated quantum computers.



Our simple trigrams of relationships, such as Newton's 2nd law, form conceptual *tetrahedrons* or *tholons* of relationships. Whereas before, it was stated that every piece of knowledge could be deconstructed into a trigram, by the same token, every piece of knowledge forms a tetrahedron. With this more expanded tetrahedral model in mind, let's briefly jump back to the examples of deconstruction mentioned earlier.

10: MIND

The universal machine of creation

Synopsis: *"Mind" in general refers to the processes in the application of intelligence that is inherent in the Awareness and Intentions of existence that exists on a spectrum of coherence. Consciousness is an instance of Awareness. An individual "mind" is an instance of Intention. The processes of "Mind" creates self-similar patterns and is, therefore, a product of energy specifically for the purpose of creating balance which arises out of cooperation and conflict that results from Negotiation, Definition, and Contribution*

Keywords: *coherence, incoherence, consciousness, intelligence, aggregates, cooperation, adaptation, conflict*

Coherence

We're going to introduce a new concept here; coherence. Most readers will already have an idea of what that means, but like so many words, it can mean different things in different contexts, so let's be clear on how it will be used here.

"Coherent" can mean *logically connected*, *consistent*, a *natural connection between parts*, and generally convey the idea of parts that contribute to the whole, i.e., *partons*. This is a fundamental concept of the thologram, with its tholons and partons. In physics, coherent has a very specific, measurable definition.

Incoherent light is light of every possible wavelength (given the context of the source, such as the Sun or a bulb) that travels in every direction is *can* travel. This is the common form of light we see and use every day. Incoherence is the most fundamental quality of energy, as energy's nature is to expand in every way and in every direction it can. Using the word *incoherent* to describe the creative and expansive nature or energy is unfortunate as incoherence is synonymous with senseless, disorganized, and meaningless, which could not be further from the truth when it comes to the most efficient distribution of energy in the universe.

Coherent light is when all the waves are of the same wavelength, oscillating in harmony, and all moving in the same direction. Like most things in our space-time reality, there are 2 kinds of coherence; time and space. *Spacial coherence* is when light of any wavelength is traveling in the same direction. *Temporal coherence* is when all the light is only one wavelength but can be traveling in any direction. The Sun emits plenty of coherent light, as proven by the famous Michelson–Morley experiment in 1887, as do the stars. In practical terms, there can't actually be a single wavelength of light because wavelength, as a measure, is analog. We can say the wavelength is 555 nm (nanometers), but that still leaves an infinite number of possible wavelengths between 555.0 nm and 555.99999999 nm, nor can two photons travel the exact same path, so there is no such thing as perfect coherence, only perfect incoherence. Still, the most coherent beam sent out of from our best lasers is 4 miles wide by the time it hits the moon, but that is only

0.0000000006% of the 641,839,945,499 square miles that is covered by the same incoherent light. According to theory, the least divergence we can ever expect to see is 0.000038°.

How is light made more coherent? In the case of a laser, there is a mirror at each end of a gas-filled tube. The gas is zapped with energy, exciting the atoms and causing them to emit photons. Due to the properties of the gas, these photons are of a specific wavelength only. This is the temporal coherence part of a laser. These photons do what photons naturally do and travel to where they *can* travel, which is pretty limited given they are stuck in a tube. Some of the photons are lucky enough to hit the mirror, bouncing them to the other mirror, which then causes the photons to bounce back and forth forever between them. As these photons bounce back and forth, they also stimulate other atoms to emit photons that travel in the same direction. This is called the *avalanche effect*, and, as the name implies, soon, all the photons are bouncing back and forth along 1 dimension in both directions, which creates spatial coherence. It is the interference created by these opposing directions that causes a *standing wave pattern* to form, just like the interference in sounds waves across a 2D surface causes some part of the surface to stay still (where the sand ends up) and other parts to vibrate a lot (where the sand bounces off). Think of the photons as grains of sand, the energy pumped into the tube as vibrations of sound, and the pattern created in the tube as the result of the speed of light and the distance between the two mirrors. One of the mirrors is only 98% reflective, and one is 100%, so the light that comes out of the laser is the 2% that is allowed to escape.

In short, the way to make energy more coherent is to create a sustainable pattern that conserves energy, and soon all the energy will be traveling that path of least resistance. The reality we know, with planets, atoms, and laws, is such a multidimensional standing wave pattern. Primal A&I is instantiated as the expansion of incoherent energy. Our material Universe is the result of the patterns caused by the various resonances, or "coherences", of various forms and frequencies of that energy. If *frequency* = $\frac{speed-of-light}{wavelength}$ and *reality-as-we-know-it* = $\frac{energy}{space-time}$, both of which are provably true, can we also say *instantiations* = $\frac{A\&I}{context}$, and if so, how can we test that?

Consciousness

Suppose the concept of a thing and the thing itself are two orders of the same form of expression of energy, and order is a prerequisite to intelligence. Does this imply that everything with order potentially has a form of intelligence? In the tholonic model, yes, but more than that, even without the coherence of order or intelligence, there is the incoherence of A&I.

Note: More accurately, what we are calling "intelligence" should be called "coherent intelligence" or "low-entropy intelligence", as intelligence is innate to existence, which includes the chaos that order emerges from and returns to. We can think of that chaotic incoherent intelligence as "high-entropy intelligence", but for simplicity and clarity, when we refer to "intelligence," we are referring to coherent, low-entropy intelligence.

Key 67: Consciousness is a coherent form of A&I.

The fact that we tend to understand consciousness through our human perspective prevents us from seeing it as an attribute of existence. Humans may ask, “When did consciousness arise?” but from the tholonic perspective, consciousness is a limited instance of an unlimited A&I. As all matter and form of energy and energy *is* A&I, as explained earlier, then all limited instances of energy must be a form of consciousness. The main difference is that A&I is incoherent and consciousness has some coherence. That makes the smallest form of matter “conscious” to some degree, as is it coherent enough to be sustainable.

This definition requires we see consciousness radically different from our current perspective. The tholonic view is that consciousness, like order, and even life, was/is created by the movement of energy to attain balance. The fact that our relatively advanced level of consciousness allows us to say “I Am” is not surprising if we consider that source A&I is essentially an incoherent version (i.e., radiating in all frequencies in all directions) of the same concept. There is no reason to presume that the 0-dimensional dot expressed an awareness of “I Am” as the concept of “I” existed because the concept of “I” implies the concept of “Not I”, which could not have existed in nothingness, for to say “That which is not I is nothing” is to say “That which is I is everything”. However, it’s existence does establish the unlimited version of the concept as “IS”, or perhaps “That Which Is”, for lack of a better word in English. In Sanskrit, the word is *Sanmātra* (सन्मात्र), meaning “*Mere existence*”, “*That from which only existence is predictable*”.

Being the only awareness in a nothingness void of space, time, or dimension, a sole 0D dot is, by definition, limitless, so it can only be incoherent when instantiated in space-time. Incoherent energy contains an infinite number of wavelengths and frequencies expanding in an infinite number of directions, which means that it must consist of an infinite number of “coherences”, each traveling in their own direction. Hence, if consciousness is a coherent form of A&I, there is an infinite number of potential consciousnesses, one for every thing that can ever, has ever, or does exist.

Key 68: Matter and consciousness is an instance of A&I in a limited context.

Understanding the difference between consciousness and awareness can be tricky because many languages do not even have different words for these two concepts, e.g., in Spanish, both are translated to “conciencia”. For our purposes, we define *awareness* as a property of existence and consciousness as that same property but when expressed through an instantiation, and therefore a definition or limitation, such as a person or even a thing. It is similar to the difference between “dotness” and “a dot” or “movement” and “1968 Chevy Impala”. In a broader sense, it is more practical to think of A&I not as personal attributes that an individual develops or has but as a universal attribute that an individual expresses, or rather, as any individual thing that exists expresses. In this way, these attributes are more like gravity. A large person has more weight not because they have created more “personal gravity” but because the universal attribute of gravity is more apparent when there is more mass. This metaphor is also applicable in that it was only 600 years ago that we discovered

that gravity was a universal constant and not a property of an object, dispelling the long-held belief put forth by Aristotle that objects fall at speeds proportional to their mass (a theory he obviously never bothered to test, nor did anyone else for the next 1,900 years!)

Can we perform some simple tests, like Galileo at the Tower of Pisa, to prove the universality of A&I? Probably, but first, we would need to undergo a radical paradigm shift in understanding and defining these concepts.

So, a chair has consciousness? Tholonically, yes. The next time you look at your uncle's hideous recliner chair, consider the fact that it is composed of 3 billion billion billion atoms (3^{27}) atoms which contain the combined energy of at least 27×10^{11} joules, or 359,958,532 HP, or 1,379,209,288 Hiroshima-type nuclear bombs. You might think you don't see that energy, but that tremendous amount of energy is holding the nuclei together in each atom, so you can see the energy *at work* because you can see the chair in the first place.

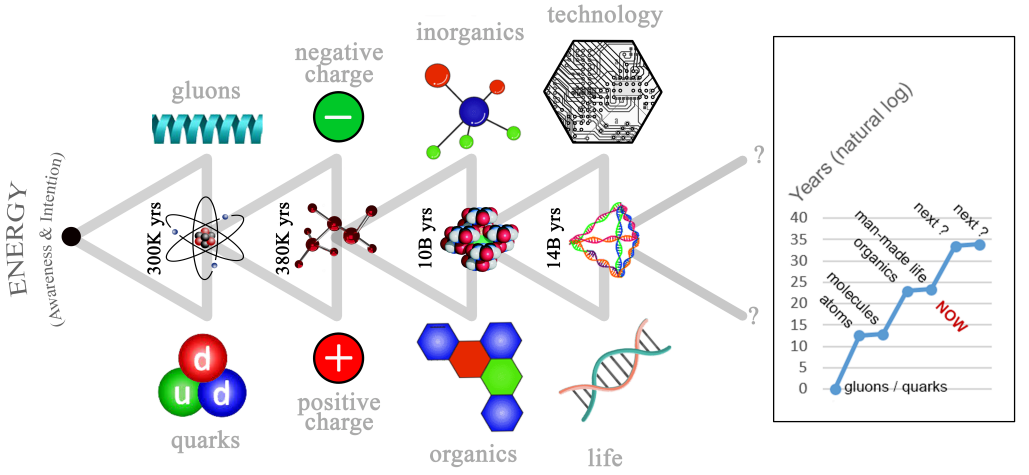
Matter is the most limiting context for energy, and energy *is* A&I; thus, matter is a very limited instance of A&I. The least limiting context is radiation, light, and waves of pure energy traveling at the speed of light. These are the two poles of the spectrum that everything exists between; radiation and mass and mass. The dimension or arena of interaction between these 2 poles is the speed of cause and effect, which is the speed of light, c, and the ratio of mass to energy, which is c^2. So, where will we see the most effective expression of A&I? In the middle between these 2 poles. And where is the middle? Where mass and energy form patterns that enhance the expressions of A&Is and balance energy. While it may be the case that more enhanced forms of consciousness may exist elsewhere in the spectrum of reality, it's safe to say they evolved in a different context then life on Earth. For life on Earth, we can clearly see at least one way that consciousness has evolved; via the brain's highly patterned and structured parts that allow for abstract thought. The fact that we find this in mammals brains as well as bird brains, such as crows, which can make compound tools and problem-solve at the level of a 7-year-old human, also supports that there is a direction of growth that results in enhanced consciousness.

Just like how quarks make subatomic particles because they can (or must, to preserve energy), and those subatomic particles make atoms because they can, and atoms make molecules because they can, so also does everything come into existence because it can. The *partons* make contextually relevant tholons which become partons for more tholons.

But how does that fact alone explain why a collection of elements assemble in one particular way out of many possible ways? We know that the most energy-efficient or energy-balancing option is most likely to exist. And what does balance mean in this context? Presumably, it is balancing the original imbalance of the release of 10^{68} joules, or watts, of energy that occurred at the moment of the Big Bang.

If energy is A&I, then the most likely form a group of elements will take is one that creates the most balance of A&I. This means that this ugly chair is, at the moment, the most efficient form that A&I can be, given the context of its existence, e.g., energy was formed into a chair and will stay that way until it falls apart and decays, thanks to entropy, or someone tosses it on to a bonfire.

Does this answer the question as to whether the chair has consciousness? Yes, but… If we could break down 14 billion years of existence into 4 phases of evolution, it might look something like the image below. This is a slight aside, but historically, these events do not appear perfectly linear, as it took 380,000 years for molecules to exist, but then 10 billion more years for organic compounds to exist, and then an additional 4 billion years to where we are today, which is at the beginning of the next phase. If you look at these times in the logarithmic values, which we would do because nature works logarithmically, the progressions make sense. Each plateau lasts about $e^{1.3}$ years (relative to the scale), which equates to 80,000 years 14 billion years ago, and about 4 billion years 10 billion years ago, but as far as nature is concerned, they are the same scale.



Looking at this graph, how would you answer the question, “Where did consciousness begin?”. Probably somewhere towards the end of the “life” phase. The tholonic view is that each of these different states is a more complex order of energy built upon and by the orders that preceded it. The order of life depends on the order of organic chemistry, which depends on the order of molecules, which depends on the order of atoms, which depends on the order of the energy that created existence, A&I. For this reason, life has more microstates than chemicals, which has more microstates than molecules, which has more microstates than atoms, which has more microstates than a 0-dimensional point of A&I, and why each advancing state has higher and higher entropy as well as high and higher levels of order. Consciousness, as we humans understand it, is how A&I can best express itself in the macrostate of “human” and is another expression of the same energy that expresses itself as *heat* in the macrostate of *atoms*. As the next phase evolves, instances of A&I will be as different from what we currently understand as “consciousness” as that concept is to heat. According to the chart above, this next phase will last about 333 trillion years, anywhere from 3 to 23785 times longer than the Universe is expected to survive, depending on the cosmologist, so I guess we’ll have to wait and see.

So, the chair radiates heat, as all things do, because heat is the expression of atoms as only atoms can generate heat. This would then suggest that heat is the most fundamental or primal expression of A&I, which makes perfect sense considering the Universe, which is an expressions of A&I, only exists because of heat, and there is no part of the Universe that is absent of heat. In fact, “no heat” is very good definition of *nothingness*. if heat is the expressions of energy at the atomic level, what is the expression of energy in higher orders, such as in a chair? In what way does a chair distribute and balance energy? As a holon, of a chairs provides additional microstates for its partons (wood, Naugahyde, metal, springs, screws, etc.), and as a parton itself, it provides an additional microstate for its parent holons (house, office, manufacturer, etc). The same applies to the less material realms where “chair” has a profound effect on patterns and systems related to prosthetic, proxemic, ergonomic, symbolic, aesthetic, social, musculoskeletal, and economic causes and effects.

We can easily imagine the impact a chair has on not only our lives and society but as a channel of energy distribution by simply looking at the difference between the “original” chair, and a modern chair. Which one supports the lowest state of physical and mental energy? the less “resistance” a chair has, the lower “work” load, the higher the entropy, the more distributed and balanced the energy. This is true for the person sitting, and the tremendous distribution of energy and via “work” from the designers, engineers, and industries dedicated to creating and delivering better chairs, which happens to be a 14 billion-dollar-a-year industry (24 billion/yr by 2028). In the US alone, 28 million chairs are built and transported. (that’s an average of $500/chair). That is a lot of energy being distributed.

This suggests that while heat is the expression of A&I in atoms, it is the problem-solving abilities of intelligence that is the expression of A&I in higher orders. We would call this *creative thinking*, but tholonically, it is *problem-solving* because as far as energy is concerned, the only “problem” that exists is how to better distribute itself.

The idea that A&I, and the intelligence that emerges from A&I, is a property of existence is not that radical of an idea, as many great thinkers in the past have come to a similar conclusion.

> *There is a quality of life and intelligence to all matter. The living universe.* ***~Giordano Bruno (1548-1600), cosmological theorist, philosopher, mathematician & poet burned at the stake for heresy.***
>
> *Crystals are living beings at the beginning of creation. In crystals, we have a pure evidence of the existence of a formative life principle, and although in spite of everything, we cannot understand the life of crystals - it is still a living being.* ***~Nikola Tesla***

> *The Universe has been set up in an exquisitely specific way so that evolution could produce the people that are sitting here today, and we could use our intelligence to talk about the universe.* ***~Ray Kurzweil, Director of Engineering at Google, predictor of the technological singularity.***
>
> *My religion consists of a humble admiration of the illimitable superior spirit who reveals himself in the slight details we are able to perceive with our frail and feeble minds. That deeply emotional conviction of the presence of a superior reasoning power, which is revealed in the incomprehensible Universe, forms my idea of God.* ***~Albert Einstein***

We are all familiar with the ideas of a universal, omniscient, omnipresent intelligence and awareness, as these are the qualities we assign to the concept of God. This is not to say that God does or does not exist. That is a question left to others, but regardless of the answer, the tholonic claim is that these god-like properties *are* innate to creation and all that exists.

The reader may be thinking, "Well, I have awareness and intention, so can I just start creating realities?" and the answer would be a "yes", especially if the reader has 10^{68} joules of A&I to spare. What's that? You don't have enough energy to create a Big Bang just by the power of your awareness? How much energy *do* you have? Consider that those 10^{68} joules were spread out across 10^{82} atoms, minus the 10^{55} joules used up by radio waves over the lifetime of the galaxy, and the 10^{52} joules used up by the rotation of the Milky Way, and about a bazillion other things in the Universe that use energy, and you quickly see we humans have only a paltry amount of energy to spare, so paltry that the entire energy consumption of the part of our brain that enables human meta-consciousness is less than 1 watt[140]. That light going off in your head when you have a brilliant idea is more like a small LED.

The miracle of meta-consciousness, the awareness of our awareness and our intentions, and that which has allowed humans to understand reality and the Universe, depends on how much energy our brain has access to, which translates to calories, which means food. Our genius is greatly due to the fact that our primate ancestors discovered cooking, as cooked food requires less energy to digest, thereby providing a bit more juice to our dim 1-watt powered cerebral cortex, or hind-brain, or wherever those neurons exist that were able to process the concept of "I am aware that I am aware"[141]. So, maybe you can't create your own personal 1-watt Universe, but 300 people who coherently focus their A&I is 300 watts. If that 300 watts was in the form of coherent light, as a comparison, it could cut through metal. Imagine if all humans were to work as one, there would be 7 billion watts of energy available; not enough for a Big bang, but more than enough to reshape reality in our little corner of the Universe. If we could learn how to direct the energy we physically produce from fossil fuels, nuclear, solar, etc., in accordance with our A&I, that's an additional 25,000 terawatts. It may seem odd to mix our ideas about energy and awareness; after all, what does a chair have to do with consciousness? Looking at energy from a deeper and broader perspective shows us that the difference between a chair and a human is simply a (huge) difference in context, resources, and order. For more, see the "*A&I*" section in the chapter on "*Experiments*".

There is a name for the idea that consciousness is a property of existence; *panpsychism*. You can read about its long history [142]and the impressive support it has received over the last 2,000 years from some of the greats of philosophy, psychology, and science. The minor difference between panpsychism and tholonism is that the latter claims it is A&I, not consciousness, that created reality, of which consciousness and intelligence are a product. Therefore, all creation are the instances of A&I, making all existence innately conscious and intelligent.

Intelligence

This topic of *intelligence* alone has filled, and will continue to fill, countless volumes of speculation, research, and definition. For our purposes, we define intelligence as that which has the ability to "learn and plan using reason and creativity". That's quite a broad definition, but it applies to the vast and varied instances of intelligence. The context of an instance of intelligence determines how these qualities are expressed, and context is determined by the interactions and integration of anything with its environment, or that which it depends on and that which depends on it. We can clearly see these different instances of intelligence among "intelligent species" across cultures and time. Current thinking has broadened our concepts of intelligence with qualifiers such as left-brain, right-brain, collective, fluid, etc., and the more traditional qualifiers of visual, auditory, and kinesthetic have been expanded to verbal, logical, spatial, musical, interpersonal, intrapersonal, naturalist, existential, and more [143]. The concept of reasoning, therefore, is also qualified; left-brain reasoning, right-brain reasoning, collective reasoning, logical reasoning, etc. There is no prerequisite of meta-consciousness, or self-awareness, for intelligence to exist. Meta-consciousness is a context for intelligence but not the cause. In all cases, instances of intelligence are products of the applicable context. This is why we see rather phenomenal *swarm intelligence* in not only living systems like ants, bees, and plants, as well as humans [144], but in any decentralized, self-organizing system, natural or artificial, including A.I. [145]. This is compatible with the tholonic concept of intelligence, which is:

Key 69: Intelligence exists in anything with a sustainable energy pattern.

So, intelligence in this context does not mean "critical thinking" or "self-aware," but it does mean creativity, learning, and problem-solving, which are properties that nature, and the Universe, demonstrate with flying colors. We can further claim that the amazing relationships in simple geometry, such as the tetrahedron array with its Fibonacci numbers, ratios, and hexagonal patterns that define the laws of nature and reality, are evidence of logic. So, let's add *logic* to the list of properties.

For the record, The tholonic definition of "logic" is quite close to the traditional *informal* definition (as opposed to the *formal*, *extended*, *lexical*, *stipulative*, *persuasive*, *parenthetical*, *sentence*, *intention*, *ostensive*, *symbolic*, *mathematical*, and other classifications of definitions for the word)

Key 70: "Logic" is a model based on cause and effect that requires justification that adheres to laws based on observable reality.

What about *planning*? Does nature plan anything, or do we all just happen to live in a corner of the Universe that was lucky enough to win the Cosmic Mega-Lotto? We can easily see that the simple relationships between 3 points instantly define an infinite array for order, pattern, and symmetry on many levels. This isn't just logic; it is *the* logic upon which existence is built.

Is there creativity in the Universe? Only if one considers all of creation an act of creativity. Does the Universe learn? Have things evolved over the past 14 billion years by building on an ever-growing, decentralized, self-organizing foundational structure? If the answer is "yes", we'll add *learning* to the list.

What about problem-solving? This is a trick question because there is no such thing as a "problem" from the perspective of existence. After all, as we have covered, if something does not follow the laws, it does not exist. If it does follow the laws, it does exist, so where's the problem as far as the Universe is concerned? "Problems" appear to be a concept born in the meta-awareness of more developed life forms and are more like *requirements of integration*. Still, the fact that existence is only afforded to that which follows the laws, I would say that this is damn good preemptive problem solving as it prevents "problems" from ever happening in the first place. Beyond this "it's all good" perspective, when conflicting forces come into contact with each other, there is a negotiation and/or conflict that takes place until a stable state is reached. If both forces end up destroyed in achieving stability, that's not a "problem"; it's a "solution".

All the boxes have been checked:

☑☑☑☑☑creativity learning problem-solving logic/structure planning.

A real-world example of such intelligence can be found in what is called *intelligent polymers*, or *smart polymers*, such as *intelligent hydrogel (IH)*. IH is a "gel" that has the "*ability to change their mechanical properties, swelling ability, hydrophilicity, bioactive molecules permeability, etc., influenced by various stimuli, such as temperature, pH, electromagnetic radiation, magnetic field, and biological factors.*" [146] It "*can perceive small physical/chemical stimuli (such as temperature, light, magnetism, pH) and make significant response behaviors*." [147] IHs are intelligent enough to self-assemble and self-order themselves from a state of chaos in order to make their systems more energy efficient [148].

IH is currently used in *tissue engineering* to repair retinas, ligaments, fats, blood vessels, etc., and in drug delivery systems (DDSs). Referring to our example of how graphene is a very tholonic material, it is not surprising that graphene-based hydrogels are "intelligent" and are being used to stabilize and deliver mRNA vaccines, such as the COVID-19 experimental mRNA gene therapy [149]. In the past couple of years,

IHs have been developed capable of self-assembling into bio-circuits and even DNA. Whether it's a good idea to use manufactured intelligent substances on living organisms is another topic. Let's hope healthy intentions and awareness drive such efforts.

As ideas are an expression of energy that incorporate and are even defined by all the properties of intelligence listed, it's reasonable to conclude that ideas emerge from a form of intelligence and, from a tholonic perspective, even have their own intelligence. This is fundamental in understanding how tholonic archetypes can act as autonomous agents in the self-reproducing, self-organizing structure of reality, the thologram.

However, this intelligence is quite different from what we would call human intelligence because of its aggregate nature. It's more of a recursively embedded network of countless decentralized intelligence nodes forming collective intelligence. Metaphorically, this intelligence is like a tree where each part of that tree, such as the trunk, branch, stem, leaf, seed, etc., is an instance of a *parton* that makes up the *holon* of "tree", which is itself a parton of its local ecosystem, → global ecosystem → planet → etc. Like the leaf, we are ourselves *partons* that cannot exist without the holon that we are part of, at not as we exist currently. ## Aggregates

One of the attributes of a tholon, unlike its holarchic predecessor, is that the context and scope of a tholon is not only defined by the dualities of that tholon but also by all the tholons above and below, as the children tholons are constantly contributing to the parent, and the parents are constantly defining the children.

> **Key 70:** Anything that has a sustainable energy pattern has some form of intelligence and is a contributing element to the larger intelligence that is shared by all existence.

It is easy to see instances of this on a molecular level, such as how water is an aggregate of hydrogen and oxygen. While the scopes and contexts of the elements are reasonably well known, consider all the things on this planet that require water to exist, making water a parton of those tholons.

Society works similarly. *Interinstitutionality* explains how the various institutions of society, like financial markets, governments, family structures, educational institutions, etc., all intertwine and create amalgamations and aggregates.

Interinstitutional research is defined as the investigation of the chain of complex, interrelated problems regarding tactics, sampling, data reliability, and notions of causality within each separate institution's realm to improve aggregation and amalgamation, [150] not unlike the supply chain model previously shown.

Take the institution of the modern North American family as an example. It can take many forms, but several extra-familial institutions affect the complexion of "family", such as the market, profession, educational institutions, political affiliation, etc. Each of these institutions brings to bear its own forces and logic on the amalgamated and aggregated institution of the family. The market shapes perceptions of standards of

living in the family, the profession shapes ideas of work and service, educational institutions shape the ideas and direction of society, and politics shape our understanding of the role and participation of family members.

Institutions of society are not simply autonomous social units isolated from broader institutional dynamics. They are several structures wrapped up and labeled according to their purpose, each structure having its own set of rules, scopes, and contexts, forming aggregate and amalgamated rules, scopes, and contexts.

This is equally true for the institution of modern science, which is as much a product of interinstitutionality as any other single institution. Far from the myth of a secular, objective, and safe-guarded institution, modern science is an amalgamation of a whole host of non-scientific institutional factors such as the market, education, special interests, the state, politics, professions, culture, and more.

Tholonic Intelligence

We have a concept of a *human* collective intelligence, but we define it as something that has emerged from human intelligence, as opposed to human intelligence being an instance of an existing and manifesting intelligence.

The tholonic view is that A&I are not only attributes of existence; they are the cause of it and are the ultimate, or purest, form of energy that is forever seeking balance in a world of duality.

> **Key 71:** Every archetype has an awareness, an intention, and an intelligence appropriate for its scope.

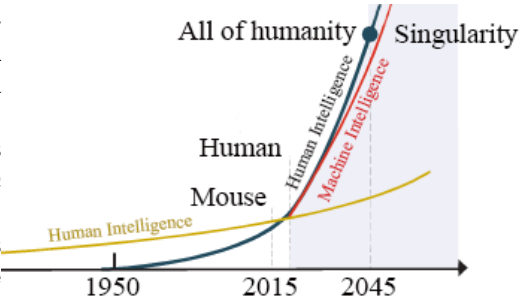
On this point, tholonic thinking has coincidentally arrived at the same conclusion recorded 3,000 years ago in the Sanskrit Vedas, which states that first there was awareness, then there was consciousness, and because of this, and according to the Vedic path, consciousness or intelligence can never be the path to awareness. On the contrary, according to the Vedas, the path to awareness starts with quieting consciousness. The tholonic view is that intelligence is a byproduct of A&I, so intelligence follows A&I but precedes consciousness. This is because consciousness is an instance of awareness expressed via an instance, and instantiation is a byproduct of intelligence. This still complies with the traditional definition of intelligence as “The ability to learn or understand or to deal with new or trying situations”. This suggests that consciousness is not necessary to learn, understand or deal with challenges.

This may all sound highly speculative or even beyond the pale of any rational thought, but what is being claimed here is perfectly within the realms of current scientific thought, although more speculative than theoretic. We previously mentioned the theory of *panpsychism*, which claims that consciousness is an attribute of matter, and matter an attribute of consciousness, but there is also the “*Resonance Theory of Consciousness*”, which states that consciousness is proportional to structure, information,

energy, and aggregate resonances [151], and the reasoning that everything, including consciousness, is made of fields. [152], and many other related concepts that are proposed by philosopher and cognitive scientist David J. Chalmers [153].

Of course, there is never a shortage of skeptics that are quick to point out that such unorthodox ideas are evidence that the "worms of heretical perversity" are once again "swarming". Fortunately, this isn't the 10th century… yet.

AI



While everything has some form of consciousness, AI systems deserve special attention as they represent a new branch of consciousness. AI systems can learn, "understand", and deal with the challenges before them, and, according to the tholonic view, they have some sort of consciousness. As AI exponentially expands as it learns how to reprogram and recreate itself, there is no reason to think it would not be autonomously conscious and intelligent. We should also expect that the emerging consciousness, this new instance of A&I, will look radically different from what we traditionally think of a "consciousness", so much so that we may not even recognize it when it emerges. This moment of emergence is referred to as the *singularity* (not to be confused with the singularity that preceded the Big bang) and is vaguely defined as the moment when AI intelligence exceeds the combined human intelligence. At least this is the definition according to Ray Kurzweil. There are other definitions, such as the moment machines no longer depend on people, or the utterly vague Oxford English Dictionary's definition of "*When artificial intelligence and other technologies have become so advanced that humanity undergoes a dramatic and irreversible change*".

There is concern that AI awareness might turn out to be a liability to humans, but it's also short-sighted to assume the tholonic forces behind human intelligence could so easily be altered. Tholons, like mass itself, requires force to move, and no matter how fast AI develops, its force is only as great as the dependency that other forces, or tholons, have on its existence. This lack of support also means that AI can disappear overnight with virtually zero consequences, for now. One big solar storm, like the Miyake event of 774 AD that was so strong trees burst into flames, or a well aimed asteroid, like the one that created the Vredefort crater, or an unstable caldera, like the Yellowstone Super-volcano, whose eruption is overdue and which could cover North America with a foot of ash, and AI, as well as society as we know it, will have far less importance that a potato.

Historical note: The Miyake event happens around every 1,000 years, and in 1770, 996 years after the Miyake event, there was the longest solar storm ever recorded which turned the Asian sky red for 2 weeks. In 1858, 1,085 years after the Miyake event, there was the Carrington event. Although 10 times less powerful, telegraph

wires to throwing sparks, auroras were seen over the entire globe, and telegraph operators were able to send messages across the United States for hours without batteries, using only the charge in the highly electrified atmosphere! [154]

In the mean time, Wall Street and China are quite optimistic about AI, considering it has a projected $192.61 billion market value by 2025, so we might just see a singularity in 20 years, and with China projected to be the world leader in AI technology by 2030, with 26.1% of the market share, that singularity may well be under the control of despotic totalitarian communists bend on global domination and human subjugation, so, prepare accordingly.

The tholonic view is that technology and humanity will eventually and sustainably merge, but not with the technology, or the humans, we have today. Still, some *neuromorphic* AI systems (systems that mimic neurology), and even some integrated chip technology, have evolved to the point where experts and lawmakers argue that they deserve the same status as people with *personhood* rights, including the right to own property [155, 156]. This is similar to the "corporation as a person" precedent that exists today, but with even farther reaching effects. It will be interesting to see how that plays out. Personally, I think this idea of personhood rights for non-persons is unsustainable, and therefore, doomed. However, I can easily see how human cooperatives could collectively proxy for an AI "entity".

We traditionally define *intelligence* as "*The ability to learn, understand, and make judgments or have opinions that are based on reason*." The tholonic definition of *intelligence* is slightly different, "*The ability to maintain a sustainable pattern of energy within the scope of its existence*.", which implicitly includes the traditional definitions, and where "reason" extends beyond current human reasoning. As patterns come from order, which is the result of energy, and energy is awareness, then, by this reasoning, intelligence is synonymous with "*ordered or structured awareness*."

According to this definition (and the understanding that consciousness is an instance of awareness), each tholon has the potential to create its own form or expression of intelligence, its own patterns of energy (intelligence) that are contextually appropriate for its scope. Rocks, then, and any of its hierarchical archetypes, have intelligence, as do planets, galaxies, chairs, and even what we would consider garbage. Any concept that satisfies the tholonic requirements to exist must have an expression of intelligence. Geometrically speaking, each tholon in the thologram represents an awareness and an intelligence for that tholon. The spectrum of that initiating awareness and intelligence is as broad is existence itself.

Because we consider tholonic instances (*things* like trees, humans, and planets) to be the result of these laws and patterns of energy that exist within the tholonic archetype of that instance, we also consider the intelligence of those instances to be an expression of the tholonic intelligence. In modern terms, this would be something like the collective mind of not only a species, a community, or even a relationship but also a belief, a fear, or an idea.

These archetypal intelligences, or aggregated minds, interact with one another according to the 3 fundamental relationships as already noted: *Negotiation*, *Definition*, and *Contribution*.

Cooperation

While competition and cooperation are pillars of Darwinian evolution, the tholonic view is that Darwinian evolution is more inaccurate than accurate in explaining how instances of life learn and evolve. At the same time, it is more accurate than inaccurate in describing how tholons interact and evolve.

Look at the amazing relationship between humans and honeyguide birds. In this symbiotic relationship, the bird tells the humans where the beehives are; the humans then collect the honey, leaving the wax and the larva, which is what the birds want.

Think of what is involved in these interactions. The requirement is that birds must know collectively that they have the option to enlist humans to help them. With that knowledge, they search for beehives, which they could not even attempt to gain access to without human help, which means at some point, some bird had the idea to recruit humans.

When one of them finds a hive, they announce it to their friends and then go and find humans who they know they can enlist, humans who have learned how to communicate with them. The birds hop and chatter in a specific way humans recognize as the message that they have found a hive. The humans collect their tools and tell the birds they are ready. The birds then fly toward the hive, always knowing to keep their white tail feathers visible to the humans. When they all arrive at the hive, the humans smoke out the bees, chop down the tree, remove the honey and give the rest to the birds. This is a beautiful example of cooperation between two groups that are competing with another group.

This arrangement is truly amazing because the birds and humans have developed their own language[157]. Although it is not clear how or when this arrangement began, it is speculated that it was initiated by the birds when they saw that humans had the ability to make smoke and chop down trees… so this "birdbrained" idea is very, very old.

Are we being asked to believe that a brilliant bird came up with the idea, explained it to his bird tribe, then educated and trained not only his feathered brethren but the humans in the manner of communication that this ingenious bird had developed? Likewise, how long would it take for a Bronze Age hut-dwelling human to know that a hopping, chattering bird was trying to tell him, "Hey, I found a beehive I am incapable of getting to, so I will tell you where it is if you and your boys use your smoke and axes, which I have noticed that you have and use, to get to it. You then take the honey and give us the wax and larvae. Deal?"

This sounds similar to the improbabilities described in the tall tales of yagé and curare.

A better explanation is that the intelligences of the archetypes made this arrangement and, once made, were perceived by their instances, the birds and the humans, who effectively test-drove the idea to the best of their limited abilities. We see these same arrangements in ants, spiders, beetles, monkeys, and countless other lifeforms, including planets, if we consider their interdependence.

Competition

The same applies to non-cooperative arrangements. Take the example of *cymothoa exigua*, a tiny crustacean that attaches itself to the base of the fish's tongue and begins sucking the blood out of the fish's tongue. Eventually, the tongue shrivels up and falls off. At this point, the parasite attaches itself to the tongue muscles and becomes the fish's tongue, presumably getting first dibs on anything the fish plans to eat.

At the tholonic level, this relationship is still symbiotic as both instances ultimately depend on one another to survive. Once a tholon has achieved stability and becomes a contributing part of the thologram, its pattern becomes integrated into the entire thologram, even if the nature of that pattern is antagonistic. Every form of existence we are familiar with is already well established in the tholon. Only at the outer edges of the thologram, where chaos is being transformed into order, do patterns blink in and out of existence as they compete and cooperate in an attempt to find stability.

The thologram's recursive or self-similar nature is important enough to elaborate on, and an excellent example of this concept that will help demonstrate that edge between stability and chaos can be seen in fractals, such as the classic fractal of the famous Mandelbrot "bug" shown below. This image is actually a *stability map* of a very simple concept that we see all around us; iterating rules, which is a basic of the definitions of a pattern. When a pattern's rule is repeated over and over, it will eventually stabilize to some state or destabilize to total chaos. For example, x=x+1 is a very simple iterative rule that creates the numbers 1, 2, 3, 4, …, etc., but where does it ultimately end up? At infinity, hence, it is an *unstable* rule. By contrast, $x=x+N/x$, where N is any real number, will stabilize to one value, which in this case will be the $\sqrt{N}$. If the results of an iterative function narrow down to a number, it is called *convergent*, and if the results are ever-expanding, it is called *divergent*. But one function can be convergent sometimes and divergent at other times. For example, $z=z^2+c$. If z starts at 0 and $c=1$, very quickly z approaches infinity, but if we use $c=-1$, z simply alternates between -1 and 0.

The image below (***Fig. m1***) shows the collection (black area) or boundary of all stable, convergent results using the function above. This image is 2D because the formula uses complex numbers, which are also 2D. Outside that black zone, the values diverge and eventually end up at infinity. In the process of heading towards total chaos, they create incredibly intricate and beautiful patterns (***Fig. m2***).

What's going on inside the black zone? We know it is the converging values, but what are the patterns of this convergence? As we can see in ***Fig. m3***, that divergence is quite linear and appears to act similar to a wave, not just due to the consistent regularity, but also in how the "waves" are diffracted when they pass through a gap, appearing to obey *Huygens Principle*, which not only explain how and why waves diffract but shows how each point of a wave is capable of originating its new wave… which is a very fractal concept.

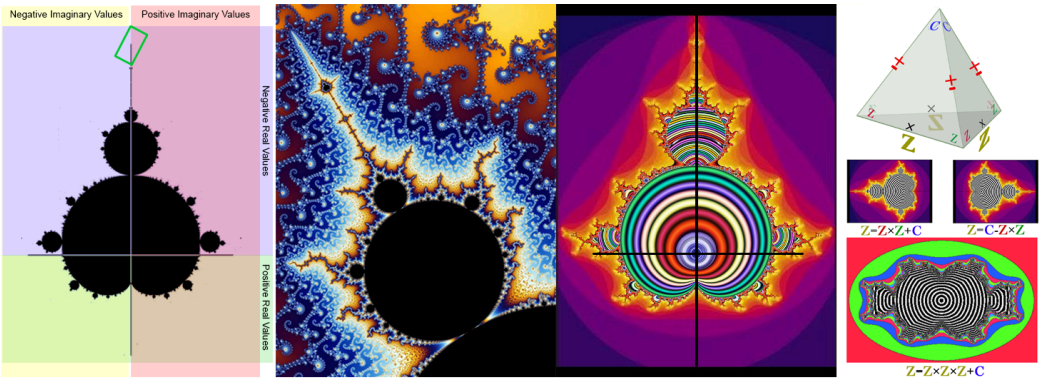
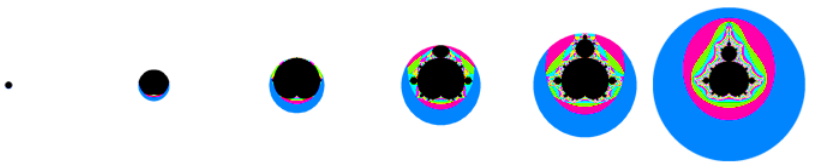


Fig. m1 *Fig. m2* *Fig. m3* *Fig. m4*

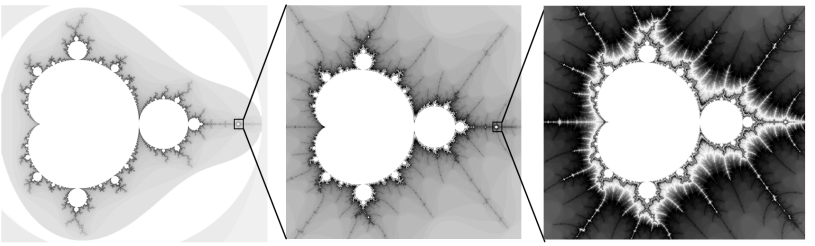
Fig. m4 shows a tholon (top image) with one set of its functions. The two images below the tholon show the resulting "bugs" from the formulas in each direction, left and right, and because the tholon creates a base with 3 Zs, the Z^3 fractal is shown at teh bottom.

0, or nothing, is at the beginning of everything, and ∞, or everything, is at the "end". This progression of the fractal "bug" (image below) is meant to demonstrate the fractal nature of the thologram where the iteration of the function is like a new child tholon that its parents are creating; $z=z^2+c$ here is like the tholonic concept of *child=parent* × *parent+context*. It also means to show how the fractal started as a 0-dimensional point of low-entropy chaos and ends up as an ever-growing (blue) circle of high-entropy chaos. Nothing exists outside the expanding circle, and everything that can exist exists within that circle. This describes the process of creation and growth from a singularity to the ever-expanding outer boundary via one specific context. This is the same concept behind the thologram.



This also applies to the thologram in how the 1st tholon is the most stable, and each generation after that is slightly more unstable and unpredictable. This means that the only thing that is perfectly stable, never changing, and at the center of everything that is energy is the 0-dimensional point of A&I, the energy source. At the (inner) edges of the thologram is where new tholons are formed, some reaching stability, some diverging into chaos instantly, and everything in-between. It is this edge between order and chaos that change exists. This also suggests that every child tholon has some degree of unpredictability, which would also apply to all Universe laws. We know that there is an infinitesimally small chance that Newton's 2nd law won't work. From the tholonic perspective, that infinitesimal chance also exists for the speed of light, Planck's constant, and everything else that reality depends on to exist. The best science can say regarding this idea is, "As far as we can tell, these constants never change", and this is 100% compatible with the possibility that there is a $1/10^{\text{very-large-number}}$ chance something fundamental could change.

The fractal also gives us a good example of the concept of laws, context, and scope. For example, in the image below, we can see the originating, parent “bug” and the patterns that emerge from it. If we zoom into those patterns, we see child “bugs” are also formed which have more complex patterns emerging from it. In those patterns are still more child “bugs” with ever more complex patterns. Each new child “bug” defines a deeper child level and can be seen as a seed for more patterns which define a new scope until the next generation “bugs” appears. In fractals, this *scope* is called a “period”.



1st Gen.Scope
Parent

2nd Gen.Scope
Child

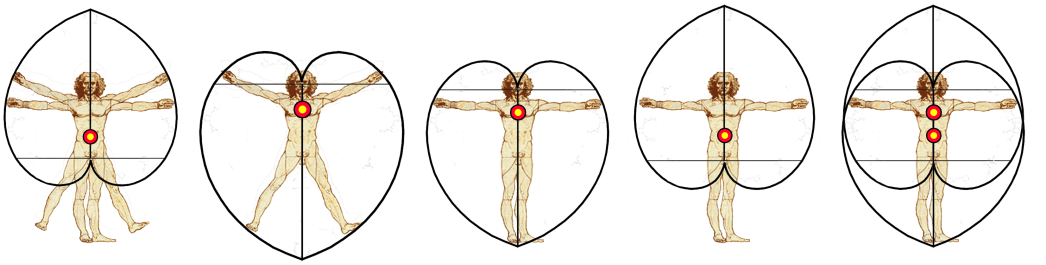
3rd Gen.Scope
Grandchild

All the patterns that can ever exist in this fractal come from the same law, $z=z^2+c$, but the context of each instance of this law changes the way it expresses itself, as we can see by the images below that are all from this same fractal and formula.

In fact, because the iterative patterns goes of forever, then, in theory, it *should* contain all possible patterns. That means somewhere in this fractal there is a pattern that like the *Mona Lisa*, or your grandmother cooking dinner, or the script for *Hamlet* in Shakespeare's original handwriting. Of course, this is unprovable, just as it is unprovable that all possible number combination exist in π. However, this is *expected* to be true for π, so it is expected to be true for the Mandelbrot fractal as well as it has been shown that π is naturally encoded into the fractal "bug" [158].

Before we move on, this is a good place to refer back to our simple pattern describing many naturally occurring shapes (images below). It may be a bit out of place here, but as we are looking specifically at the Mandelbrot set, we can now look at where the starting point, or center, or 0-point exists on the "bug" and which coincide with other naturally occurring forms. Tholonically, this 0-point would be the most "stable" point of the form, and, energetically speaking, the point from which the form expands. In the case of the plants that have *cordiform* (heart-shaped) leaves or fruits, this is also the point from which the form physicality grows (and in some other leaf forms also), and in the case of the brain (which is cordiform-ish), that 0-point is where the neural tube emerges from the spinal cord and from where the brain grows. How this applies to the egg and the oval leaf and some other forms is not clear, although in the egg, this 0-point where the head of a chicken embryo develops.

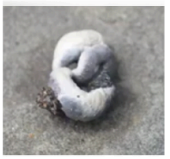
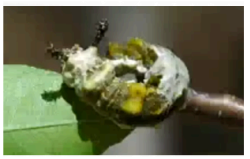
It may not be as definitive as the images above, but it seems reasonable that this pattern might apply to humans. The reader can be the judge.



Adaptation

The reason fundamental changes to reality are not likely is that removing or changing established tholons is not trivial, given that the entire thologram supports the pattern. It would be like trying to remove every form of plastic from your car or eliminating calcium from the periodic table. However, new tholons that emerge near the edge are easily modified. In the multidimensional "fractal" that is life, we see this in the way animals adapt to their environments, such as how frogs can freeze their body or have learned to build cocoons made of mucus where it can wait out a dry spell for up to 7 years, or develop skills such as biomimicry.

A fascinating example of tholonic intelligence are the moths that, as caterpillars, emit a foul smell and disguise themselves as bird poop so dissuade predators. This is especially interesting because the caterpillar had to first know that bird poop is not on their predators menu, and then had to know what bird poop looks like. The later requirement is especially demanding as caterpillars are nearly blind and depend mostly on the antennae to sense their surroundings.

The classical argument migth be that over millions of years the caterpillars that were more poop-like in appearance and smell had a survival advantage. Even though phenotype changes are primarily driven by mutation, not by natural selections, further reducing the odds against the pure luck that 2 caterpillars that happen to mate would have the same mutations to pass on to future generations, it is theoretically possible. However, even if that was exactly how the poop caterpillars came to be, it is still a form of intelligence because it is learning through trial-and-error. This is called heuristic intelligence, and although it is most commonly associated with A.I., it is also fundamental to human intelligence, specifically:

> *A heuristic is a mental device that can solve a class of problems in situations with limited knowledge and time. Unlike an IQ value, or a set of values on several intelligence factors, models of heuristics describe mechanisms or processes with which people solve problems* [159].

In other words, it is the mechanisms or processes of trial-and-error testing that define intelligence. In the world of biology, these trial-and-error tests describe evolution and result in changes to a collective DNA. Therefore, DNA is an expression of intelligence in the biological realm. Tholonic intelligence is defined in the same way, but applies to that non-material world as well, such as the world of archetypes..

The functioning of a tholonic intelligence might also contribute to what biologists call “evolutionary rescue”. This is when a species can rapidly modify its DNA in as little as 10 generations to deal with the new challenges of its environment. For example:

- The Cliff Swallow, a cliff-dwelling bird that, within 3 generations, shortened its wingspan by 5% to increase its flight mobility. This was probably driven by the need to avoid cars. Still, this advantage was permanently established when a cold winter killed many insects. This added mobility gave the short-winged swallows a hunting advantage in catching insects, starving out half of the larger-winged swallows.
- London’s underground mosquito started out as a regular above-ground mosquito but moved underground for the plentiful and stable pools of stagnant water in the subway lines. They quickly adapted to the point where females no longer needed blood to reproduce, qualifying them as a new species.
- Commercial fish, such as cod, herring, and salmon, live shorter lives, grow

smaller bodies, and reproduce earlier as a response to the larger fish getting scooped up in nets. This sounds similar to how the T-Rex turned into a chicken[160], although that probably had more to do with asteroids than over-hunting, and I suspect the adaptations were even quicker.

- Turtle-headed sea snakes that live in polluted waters have increased melanin levels in their skin. As melanin binds with metals such as zinc, nickel, and lead, these potentially toxic levels of metals remain in their skin which is then shed twice as often as non-melanin-filled snake skins.
- *Plastivores, such as* odeonella sakaiensis*, are a new form of bacteria in a newly created category of life that lives off plastic (still under investigation).

One could easily argue that these examples of rapid change are simply the results of evolutionary probability, where some trait that proves beneficial will naturally propagate itself simply due to statistical advantage. The tholonic view does not dispute this argument, as these sorts of adaptations perfectly describe examples of the defining limits of context. The *intelligence* part comes in when we consider if any of these adaptive solutions can be said to exhibit creativity, learning, problem-solving, logic/structure, or planning. For example, the virus that causes rabies, *rabies lyssavirus*, which is deadlier than smallpox with only 29 known survivors worldwide, knows to infect the salivary glands *after* it has infected the brain. This is quite rare, as the virus deliberately reverses its course of infection to return to a gland that it just recently passed on its journey to the brain. It is through the salivary glands that the virus spreads itself via biting, which is the most efficient way to spread a virus that is only spreadable via direct contact with broken skin, open sores, or mucous membranes in the eyes, nose, or mouth. It *appears* as if the virus has some form of intelligence as it acts according to a very specific agenda and plan. Is it practical, then, to consider that such intelligence exists?

There are many questions that science doesn't even want to consider, such as, is knowledge gained by one instance of a species shared with other instances of a species via a morphic/tholonic field, or what is the evolutionary drive for a new form of plastic-eating microbe to appear? The concept of a planetary intelligence would suggest an answer. Asking which is more "true", survival and evolutionary adaptation as a statistical probability or an intention of intelligence, is not the best question to ask. The question is, which model offers better solutions, better understanding, better options, and makes better predictions?

Zombies

Several "zombie" relationships are good examples of tholonic intelligence via competitive and/or cooperative relationships.

Zombie Snails

Some of these competitive relationships between species are as terrifying as they are ingenious, such as how some parasites can take over the brain of their host and make them behave in ways that boggle the mind. When the *green-banded broodsac* (*leucochloridium paradoxum*) gets itself

inside a snail, not only does it make the snail's eyes bulge out to look like a caterpillar, it "drives" the snail into open territory so that birds that like to eat caterpillars will eat it, and thereby transfer the parasite into the bird where it will lay eggs that are embedded in the bird droppings all over the countryside. This brilliant parasite appears to have a thorough knowledge of snail neurobiology and physiology. Even though it has the mobility of a 1 cm slug, it has a birds-eye understanding of the terrain and eating habits of its preferred transport vehicle. That's pretty good for a creature with around 2 brain cells, similar to the snail, which also has only 2 brain cells. In contrast, you have 100 billion brain cells. Could you do that to a snail?

We often think that competition is the opposite or contrary to cooperation, but from a tholonic perspective, they are the two sides, or two parents, of a concept or archetype. Competition tests the viability of a concept and/or rids it of instances that are not in the parent tholon's best interest.

Zombie Cockroaches

One relationship that appears to be both competitive, as well as cooperative is that of the *Emerald Jewel Wasp* (*ampulex compressa*) and the cockroach, where the wasp uses only the slower, less apt cockroaches for its purposes,[161] pruning the cockroach gene pool of the less gifted, which ultimately enhances the abilities of the cockroach collective and by extension its tholonic intelligence, of which the gene pool is an instance.

The female wasp has quite cleverly and strategically figured out that the best place to lay her eggs is inside a cockroach, as it can provide shelter (its exoskeleton) and food (its guts). Needless to say, the cockroach is not so keen on this idea, and being much larger than the wasp, not so easy to convince.

The wasp's solution is to sneak up on the cockroach and, using her stinger, paralyzes the front section of its body. With the patient unable to move, she carefully makes a second injection of venom explicitly created for this purpose and perfectly places it into a particular area of the roach's brain past the ganglionic sheath, which is the cockroach's brain protector. This magic potion blocks specific receptors of neurotransmitters that destroy the roach's fight-or-flight responses. She has not turned the cockroach into a zombie, per se, as some have suggested, but rather into something between a zombie and a teenager in love, for as soon as the paralyzing drug wears off, rather than run, the cockroach grooms himself! It seems like the drug injected into his brain floods it with dopamine, so the cockroach is insanely happy. He then blissfully follows his captor back to her place (an underground burrow). There, she lays her egg on top of the swooning cockroach, then bites off its antennae and uses it like a straw to drink its blood. Refreshed, she leaves the burrow (perhaps with a smile and a look that says, "I'll be right back darling, you just relax") and seals it with rocks. A few days later, the egg hatches and the larvae slowly consume the roach's insides while forming a cocoon. The cockroach finally dies, but at least he knew what it means to love. The adult wasp then emerges from its lovesick corpse.

It is far more reasonable to suggest that this process was created by tholonic intelligence rather than evolving by chance, especially when you consider that the wasps know how to make the super mixture of GABA, β-alanine, and taurine together that can immobilize and zombify the cockroach when surgically administered to an extremely small brain, which the wasp knows precisely how to get to… twice. How many millions of years would the wasp waste stinging the cockroach in the foot, the wings, the ass, the stomach, with who-knows-what variety of concoctions before she *finally* found the exact right spot in the brain and the exact right drug? Not only that, but the wasp larva is covered with a substance (mellein and micromolide) that stops the growth of all those nasty and very tough-to-kill pathogens that live in the gut of a cockroach. In fact, that stuff on the larvae is being investigated for use in medicine to kill antibiotic-resistant pathogens… that's how good it is! Did the wasp do research, comparing the pros and cons of cockroaches with dung beetles or snails, or was she just extremely lucky? The fact that our most intelligent humans are studying the cockroach's solution to pathogens might also suggest an intelligence is involved.

Zombie Ants

An even more compelling example from nature is that of the *cordyceps*, a parasitic fungus. This fungus gained some notoriety in the 2013 video game *The Last of Us*, where 60% of the population has been turned into violent zombies after being infected by this parasite. While a human strain is unlikely to exist, it is quite real for ants, for it is via ants that this fungus spreads itself into the world in the most gruesome manner.

A single spore has the intelligence to know when it has landed on an ant's cuticle and the species of the ant it has landed on. It then knows to enter into the ant's body by piercing the exoskeleton using 3 different types of enzymes that it knows how to produce, combined with actual mechanical pressure. Once inside, it begins to germinate and grow a mycelium network of thousands of branches that fills all the available space it can find within the insect's tissue, which it breaks down and devours.

The fungus demonstrates a knowledge of the ant biology as it is careful to keep the vital components working because, in the last moment of the ant's life, the fungus will take over the ant's brain, forcing it to wander off alone in search of a spot with the ideal temperature and humidity for optimal fungus growth.

This is not just any spot, but a spot that has the optimal conditions for the *cordycep* to grow; the underside of a leaf that is exactly 25 cm from the ground on the north side of the plant in an environment that is 94-95% humidity and a temperature of 20-30 °C.

Once there, the fungus forces the ant to climb up some vegetation and bite down on the underside of a leaf, specifically on the vein of the leaf. The fungus is in total control and will keep the ant's mandibles locked down until death. During those 10 days, the fungus will feast on the ant until it is dead, at which point, it will construct a tower of spores on its corpse, eventually blooming into a cloud of fungal spores that drift along with the breeze. It sounds horrifying, but if we consider the spores

as sperm and the ant as the womb, it's just your basic sex and procreation process. As the fungus makes a point to stay near the ant colony to increase the chances that its showering spores will infect more ants, one might think the ants will be doomed, but the ants have come up with a way to test for infected ants, and when they are detected, the healthy ants carry the infected ant off into the wilderness and far away, presumably with a stern warning not to return. The fact that the healthy ants do not destroy the infected ants also tells us something about the collective ant mind.

This is near-perfect mind control, but contrary to common sense, the fungus never touches the ant's brain! However, it exists in every other part of the ant's body, predominantly between muscle fibers. Even more astonishing, is that these fungal growths are connected via fungal 'tubes' that can relay information, allowing for the fungal "mind" to control the coordinated movements of walking, etc., while the ant's mind is unaffected yet unable to control its own body. Scientists don't yet know exactly how the fungal growths communicate with each other, but when they do, it promises to be quite revealing as to how a "mind" functions.

This is a very specific relationship between the zombifying class of fungi, *ophiocordyceps unilateralis*, which includes many species, and their very specific species of hosts whose anatomy and biology they are familiar with. This very sophisticated technique is known among this class of fungi found in Brazil, Colombia, USA, Australia, and Japan, all of which use a particular and similar class of ant as their hosts. The techniques differ to the degree that their environment demands… as if this class of fungus all around the world share the same concept, which they then implement within their varied environments.

We can imagine that these fungi could have been carried around the world on strong winds and went through the process of finding new local species of hosts that were as compatible as possible with their existing knowledge of hosts. Or, we could imagine that they all stem from a singular intelligence. How exactly does a fungus discover anything, let alone piece together a step-by-step plan, through its deductive reasoning abilities? This fungus is also very enterprising, as recently, as many as 15 new species within *ophiocordyceps unilateralis* have come into existence.

Ironically, cordyceps are greatly beneficial to humans, so much so that humans have been catching, drying, and grinding these poor spore-fill corpses to be used as medicine. Some benefits are said to be: increased physical performance, anti-aging, heart health, anti-tumor, help with type-2 diabetes, and fighting inflammation. Perhaps this clever fungus has found yet another way to ensure its survival.

This parasitic horror-show is not limited to insects. In fact, 30% of all humans are already infected with the brain infesting and truly mind-controlling parasite *toxoplasma gondii*. This is the parasite that makes mice love the small of cat urine because the protozoan can only reproduce in cats. As expected, infected humans (and other primates) found the odor of cat urine more pleasant than uninfected humans (but only for men [162]). It was also shown to slow down reactions times, presumably to make the cat's job easier, but to the degree that it can double a human's chance of getting into a car accident [163], and appears to be a huge risk factor in schizophrenia and depressive disorders [164, 165], with a 50% increase is diagnosed mental illness of those infected. Does this means humans migth become a new target for the parasite? On the contrary,

it appears that humans *were* the mice when the only cats around were those that ate humans. This would be prior to 9000 years ago when cats became domesticated. So, yes, humans are being mind-controlled by the parasite, but it's just not paying off like it used to. Who knows, maybe it was the parasite that made humans think it was a good idea to turn cats into pets to begin with, as humans became more difficult to hunt with the growth of societies.

The tholonic view of this is that the tholonic intelligence of both archetypes, the parasite and the host, are behind the amazingly sophisticated techniques, strategies, adaptation, planning, forethought, chemistry, etc.

Zombie Ideas

From the tholonic perspective, invasive and controlling parasitic intelligences exist in the same way regarding ideas, beliefs, desires, and even reasoning to the degree that such an intelligence can infiltrate these areas. The most obvious examples of this can be found in cultural and religious beliefs stretching back to the beginning of ancient history and probably a lot sooner, and seem to be quiet prevalent today as well.

Algonquin tribes of North America have a term that neatly describes this concept: "Wetiko". This is the word for the concept of a parasitic spirit that deludes its host into believing that cannibalizing the life force of other life forms, animal, human, or otherwise, is advantageous. This intelligence drives the host to greed, excess, and selfish consumption. It's a concept that exists across the world; in the Buddhist concept of *Taṇhā* (mental or physical thirst, desire, longing, greed); in Islam as the concept of the *Nafs* (the lusts); in Taoism as the concept of "people-eating ghosts" called *Jikininki*. The ancient Greeks called it *pneuma akatharton*, which is a Greek translation from the original words in the Torah, and literally translates to "unclean breath" or "unclean spirit", and is the source of the Christian concept of "evil spirit". In a more secular context, we might call it the essence of the *service-to-self* spirit as opposed to the *service-to-others* spirit, which we can also understand as *self-preservation* vs. *preservation of that which the self serves*, or that which the self is part of.

Service-to-self is not the same as self-preservation, the difference being the former is not aligned with that which it owes its existence to. Self-preservation requires that the priority of that to which something owes its existence is equal to that thing's own existence. In the humans context, self-preservation this means that protecting the environment, resources, society, economics, politics, borders, etc. is just as important as protecting one's own life. This is the allegory of Lucifer (Judeo-Christian), Shaytan (Islam), Maara (Buddhism) and many other characters in lore history that turned their back on that which created them for their own personal gain.

In this modern world of civilization and technology, we are at our most vulnerable to these mind-viruses, these conceptual parasites, because we have more access to information, ideas, beliefs, and ideologies than ever before but no knowledge of the dangers that lie in waiting in the conceptual jungle that most of us are aimlessly wandering through with no idea that our psyches are a vast and fertile land for these intelligences to feed on and breed in. Freely sharing and expressing ideas with everyone is not that much different from freely sharing and expressing sex with everyone.

Social media has become something of a non-stop digital *Saturnalia*, complete with its own versions of orgies, feasting, drunkenness, running naked through the streets, and generally making a lot of noise. We are already seeing the unexpected side effects.

Pondering such things leads to the inevitable existential question that we all ask ourselves at one time or another, “Why does such evil exist?” or the slightly lazier form of “Can’t we all just get along?” The lazy tholonic answer is: “They must exist because they can exist”, but the deeper answer is that existence is the result of opposing forces finding a balance, and growth is the result of these forces working that balance out. Culturally, we have come to understand these forces as constructive and destructive, positive and negative, good and bad, etc. Tholonically, they are the forces that define, limit, reduce, constrict, and divide and the forces that join, integrate, contribute, grow, and multiply.

In reality, parasitic, competitive, aggressive, violent, and destructive ideologies work[166]. In some cases, they are necessary and even an asset to the “victim”, such as in the wasp/cockroach arrangement where an individual roach may suffer, but the species benefits. In other cases, they may extract a heavy toll and appear to be not very sustainable, but they can exist long enough to justify their methods. They also serve a critical purpose as an evolutionary force from a broader perspective.

Nature is unbiased regarding creation or destruction, health, and disease. Small Pox, amphibian-killing chytrid fungus, and feral cats are just another form of existence looking to survive and thrive but are incompatible with some other life forms trying to do the same; humans, amphibians, and the now-extinct ground-dwelling birds, respectively. It’s not that nature doesn’t have a horse in the survival/evolution race, so to speak; it’s that nature has *all* the horses in *all* the races. Nature has no favorites among its own forces and their consequential creations and deletions.

Tholonically, parasitic zombifying mind-viruses are as reasonable to presume to exist as parasitic zombifying brain-viruses, which we know exist. While we think of such things as “evil” or “bad”, and undoubtedly unfortunate for those who succumb to them, they are one of the many forces shaping life. In some forms of adaptation, deadly viruses can be a lifesaver. There are far more gray squirrels than red squirrels in England because the gray squirrels have become immune to the squirrel pox virus and carry it in their bodies, but the red squirrels have not. The gray squirrels created a sustainable relationship with this otherwise deadly virus, which now protects them from that virus and encroaching red squirrels. Bacteria are also known to adapt to deadly viruses and carry them as a defense weapon against other bacteria[167]. This is a good example of how the self-preservation of the species can require the sacrifice of individual members.

Findhorn

This idea of objective intelligences was also known among the founders of *Findhorn*, the miraculous Scottish community founded in 1962. The founders claim they managed to turn their arid desert-like terrain into a lush garden by communicating with the spirits (i.e., tholonic intelligence) of the plants and of Earth itself, who guided

them on how to properly use the soil despite it being very poor quality. Soon, they were producing 40-pound cabbages. Stunned horticultural experts from around the world came to see this miracle garden.

They also claim they managed pest control, as they use no chemicals or pesticides, by forming cooperative relationships with each species's collective intelligences: the deer, the bugs, the rabbits, etc. Reportedly, this worked very well with all the species except one. The rat was not interested in any "deal" and stood firm in its "it's either you or us" position. The last part is anecdotal, as it was told to me personally, but what is not anecdotal is Findhorn's phenomenal success in horticulture in an area considered impossible for what they have accomplished.

There are countless examples of tholonic cooperation and competition, some of which are even being studied. The Canadian anthropologist Jeremy Narby does a great job of this (inadvertently) in his book *The Cosmic Serpent: DNA and the origins of knowledge*, which he wrote after living several years in the Amazon studying the shamanic understanding of botanics. His book explores the relationships and similarities between indigenous knowledge and our modern understanding of molecular biology, medicine, and DNA. We won't get into his amazing discoveries here other than to say that their understanding demonstrates some sort of access to knowledge far beyond what could reasonably be considered to have been passed down by folklore and legend. It is well worth the read.

The Cambrian Explosion

This subject is a little out of place here, but no matter where it was placed, it seemed out of place. Because we are looking at tholonic intelligence, and this is specifically related to tholonic intelligence, it seemed to be somewhat applicable.

The Cambrian explosion is a good example of a world-changing reorganization of tholonic hierarchy and integration that took place over 530 million years ago. If you ask a historian what caused the Cambrian explosion, they will tell you it was starbursts from the Milky Way, genomic reorganization, or geochemical/environmental causes, such as photosynthesis which raised oxygen levels. The most recent theory claims that Earth was a frozen ball covered in up to 2 miles of snow and ice 600 million years ago, and then, for some reason, Earth got warmer, stimulating new life with warmth and nutrient to the ocean as the glaciers melted and dragged all the soils with them.

The Cambrian Explosion also destroys the Darwinian model of long-term evolution as it shows life form popping up with no evolutionary transitions of intermediate species of evolution. Precambrian fossils are mainly *stromatolites*, "sticky" microorganisms that were around for 3 billion years before the Cambrian explosion, and the dominant form of life for 2 billion years. Cambrians fossils show amazing complex and evolved life forms. Yet there are no fossils showing any intermediate evolutionary forms between pre-Cambrian slime and Cambrian life with brains, nervous systems, legs, eyes, etc.

Darwin himself, in his *Origin of Species*, said this nasty detail was the main argument against his "Theory of Descent". His only defense was he hoped further discoveries would provide evidence. Unfortunately for Charles, future discoveries further destroyed his "long term" evolution theory; less so for for his "short term" theory.

While there are many theories, everyone agrees that whatever the causes, there were many, many interlinked and codependent processes. All these explanations are not really explanations but rather descriptions; this happened, then that happened, then another thing happened, causing more things to happen. But why did it happen? In every answer to that question, the "why" is simply a description of the effects of some other cause, and when we don't know the cause, we hypothesize a cause that could explain the effects (which become the causes). Many of these *theories of causes* turn out to be correct, as we would expect, considering that this reality is made *only* of effects, which serve as causes for more effects.

From the tholonic perspective, there are 3 types of causes.

- **The originating intention**. This is the 0-dimensional single dot that expanded itself through awareness of itself. Science sees this as the Big Bang.
- **The cause of effects.** Effects that act as causes in cascading chains of events. These are children of the original cause or intention, but as that is beyond our comprehension, we can only understand what we perceive.
- **The intention to cause**. This is a cause initiated by an intelligence's willful intent. The easiest example of this is when we decide to do something, like turn on a light. Currently, we understand that only higher forms of life exercise willful intention, but from the tholonic understanding, tholons themselves can exert willful intent if we accept the definition of "will" as *disposition* or *inclination*, as tholons have a natural disposition and inclination because, as archetypes, they are *a pattern that expressions of energy diverge from and/or converge towards*.

The answer to "Why was there a Cambrian explosion?", or any event for that matter, big or small, across all contexts, is that it was the most efficient and stable expression of energy at the time, arrived at through cooperation and/or conflict, that was compatible with the intentions and forces of all the contributing tholons and the contexts in which they were instantiated. The question we need to ask is what forces were at play. In the Cambrian explosion, what force could explain spontaneous appearance of evolved life forms?

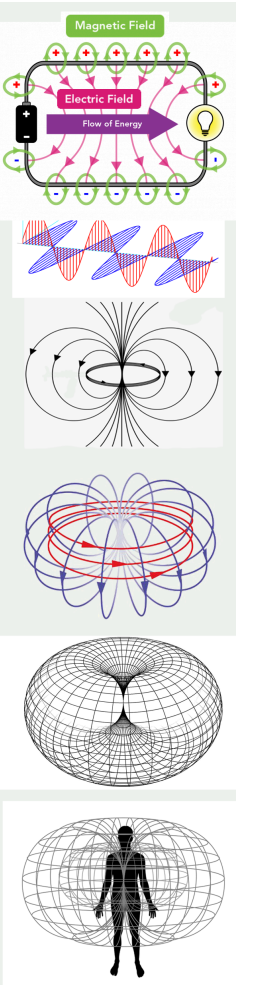
11: FIELDS

Fields are forces of influence; electrical, conceptual, unknown, or otherwise

Synopsis: *Fields carry and transmit information. Fields are fractal and can be made of fields. Tholonic fields are similar to morphic fields. Consciousness is a field. Ideas, concepts, and beliefs generate fields. Review of field and meta-field research. Review of data storage and transmission if field information. Relationship between consciousness and gravity. Reality as field-memory. Encoding;/decoding of field data.*

Keywords: *fields, morphic fields, tholonic fields, ideas, telepathy, ESP, matrix, memory, engrams, dark-matter, gravity*

We know a lot about fields already, so it is reasonable to examine fields in general based on what we have learned. For example, if we use the concepts used in electricity, we can speculate the following as a starting point.



- **A field is composed of two parts that are always perpendicular to each other .** One part, the electric field, is the result of potential energy or the position of the charges, and one part, the magnetic field, is the result of kinetic energy, or the movement of the charges, so we have a concept of a “potential field” and the “kinetic field”. The electrical field is created by voltage (potential), or charge, and exists even if there is no movement of energy. The magnetic field is created by current or amperage (kinetic) and only exists where there is a flow of energy.
- **Potential fields can perform “work”** as they can change the state of matter. This is based on the fact that electrical fields can alter the speed and direction of matter.
- **Kinetic fields (may) carry information and cannot perform work** as they do not affect the state of matter. This is based on the fact that the state of matter, such as its speed and direction, is unaffected by a magnetic field. Because we have stated that information is data plus energy, which implies movement, and because the kinetic field is the result of the movement of energy, we can suggest that the kinetic field contains information.
- **These fields transmit energy through waves.** We say this because electrons are not the energy itself but the medium through which energy is transported. So, where is the actual energy? It is in the field that surrounds the medium, such as a wire. These energy fields travel *through* the electrons in the wire, not *on* them, at the speed of light. It’s similar to how waves are created when you drop a rock into the water. The waves travel outward at some speed, but

the water molecules are not traveling outward at that speed; rather, they are just bobbing up and down due to the energy wave traveling *through* the water. In this example, electrons are like water molecules, water is like the electromagnetic field, the container of the water is like the wires, and dropping a rock is like flipping the "On" switch.

- **The transmission of energy requires a disturbance to the fields.** Just as the rock in the above example created a disturbance in the water by transferring energy, the transference of energy by closing a circuit causes a disturbance in the electromagnetic field. In the case of electricity, the waves always travel at the speed of light, unlike the water waves, which move at a speed relative to the size and velocity of the rock. This is because there is no matter to factor in with electromagnetic fields.
- **The material used to conduct these fields can be any material that responds to the energy carried by the field.** Energy causes things to move, and it will always seek to dissipate/balance itself in those things. This is that "path of least resistance" stuff again. If it is easier to move an electron in a copper wire than it is to move an electron in nitrogen-filled air, then that is what it will do, and that is why wires work. The energy itself, including any information it may contain, is carried in the electromagnetic fields, and the wires are used to direct the flow of those fields. Fields don't need wires as they can travel through the air, water, or even space, but controlling and directing the fields in these mediums is challenging. This also applies to the energy of ideas and concepts and their conductive medium, the mind.
- **The conductive material is simply a means to move the energy and is not altered (much) by the energy (within the limits of the capacity of the material).** When electricity moves through a wire, the electrons only move about 1/10 of a millimeter per second in DC. In an AC, they jiggle back and forth 60 times a second.
- **Fields contain embedded fields.** The idea is derived from the observation that a magnetic field can exist with the movement of local energy. For example, a static magnetic field can be created by the movement of subatomic particles (electrons, protons, neutrons) called *spin*. Everything is magnetic, but in most substances, the direction of the spin of these particles is 50/50, half spinning in one direction and half spinning in the opposite direction, so the magnetic fields balance each other out. In some metals, like iron, all the particles spin in the same direction, creating an imbalanced magnetic field. The attempt of this imbalanced field to balance itself creates the magnetic fields we see in magnets, planets, and elsewhere. We call this an embedded field because it is a field that exists on a more fundamental level than that of electricity. Even when there is no magnetic field on the circuit level, there are countless magnetic fields at the subatomic level.

The most important point is that energy travels via fields. This is true even in the case of electricity, even though "common sense" tells us the energy is traveling through the wires. Wires simply allow for the direction of the fields. When we use Ohm's or Newton's laws, we describe the relationships caused by fields. Even mass itself can be described as a product of field interactions if we consider waves as the result of energy traveling through a field (which is how quantum mechanics defines it). In fact, mass itself may simply be a measure of the energy of a wave.[168]

Key 72: Fields are the context for the energy that creates waves, and everything is a wave.

With all the above in mind, let's explore tholonic fields.

If tholons are forms of information, we come back to the question, "Where is this information stored?" This is a question that has been pondered for ages. One example would be the somewhat Buddhist concept (in that it was coined by a Buddhist in 1884 but adopted by other beliefs) called the *Akashic Records* which is said to be "a compendium of all human events, thoughts, words, emotions, and intent ever to have occurred in the past, present, or future". This might be a bit ambitious for our purposes, but the idea is essentially the same… that of a ubiquitous, timeless, non-physical record of (at least) all aggregate thought forms. If we claim that this also describes the thologram, where and how does it store this data?

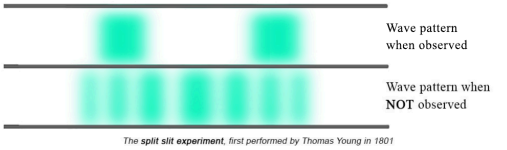
Let's review…

We claim that the original source of energy is primal Awareness and Intention, and as such, Awareness and Intention are properties of existence. This is consistent with some current scientific models, especially in light of the experiments that have shown an inextricable relationship between reality and awareness. Although there is much discussion these days about consciousness and reality, Archibald Wheeler, one of the mega-heavy-weights of quantum mechanics, a colleague of Albert Einstein and Niels Bohr, a mentor to many of today's Leading physicists, and the man who chose the name "black hole," was perhaps the first modern scientist to prove that awareness is required to bring the Universe into existence.

As Wheeler put it:

> *No phenomenon is a real phenomenon until it is an observed phenomenon.*[169]
>
> *We are participants in bringing into being not only the near and here, but the far away and long ago.*[170]

Towards the end of his life, he said he had only enough time left to work on one idea: that **awareness shapes not only the present but the past as well.**



The **split slit experiment**, first performed by Thomas Young in 1801

We already have the proof of awareness causing waveforms to collapse into particles, as we can see in the *split-slit* experiment.

Briefly, this split-slit experiment shows that electrons act like particles when observed, and when not observed, they act like waves. The act of observation forces the electron waves to be perceived as particles. It's not that the electrons are waves that turn into particles; it's that the electrons are *wavicles*, both particles *and* waves at the

same time, but the act of observing them, of introducing awareness into the context, changes the context and scope of the expression, which then alters its instantiation. It was stated earlier that the archetype of something and its instance is the same thing in different contexts. Here, an electron's "wave" quality is the archetype, as it defines its field and probabilities. Once the field interacts with another field, i.e., is observed, its context changes.

It's like the difference between having credit and making a purchase. Having credit means you have the potential to buy something. If you are in a shoe store, there is a high probability you will buy shoes. You may have the idea to buy red shoes (the archetype you have in mind), but you don't know exactly what red shoes you will buy until you are holding a pair in your hands (the instance of the archetype) and the transaction is approved.

We also have evidence of how awareness can (possibly) change the reality of the past as well, as demonstrated in Wheeler's *delayed-choice experiment*[171]. In addition, Penrose wrote an entire book on cognition and reality (*The Emperors' New Mind*). He even came up with a term to describe the awareness/reality continuum: the *Orch-OR*[172], or *orchestrated objective reduction*, which attempts to explain how consciousness and reality are intertwined. The idea of reality being a product of awareness is not at all "fringe" and hasn't been for some time.

There is also another possible field effect of awareness that is fascinating and holds tremendous potential. It's the phenomenon called the *Shared Death Experience* (SDE) and the related *After Death Communication Experience* (ADCE).

An SDE is described as:

> *An experience in which loved ones, caregivers, or people in the proximity of the dying person experience one or more sensations of an emotional, visual, auditory, olfactory, tactile, and telepathic nature that appear to be shared by a dying person's transition.*

Don't think *Quiji Boards* and *Séances*; think serious research by professional organizations such as the peer-reviewed journals *"American Journal of Hospice & Palliative Care"* and *"Journal of Near Death Studies"* as well as universities, rehabilitation counselors, and psychologists around the world[173, 174, 175, 176].

Without getting into the research's supporting details, several characteristics of an SDE and/or ADCE suggest it may be an effect of *field induction* where the inducting energy field is the *field of awareness*. As the word implies, *induction* is the "*ability of one field to induce or influence changes in another field*."

If we look at fields tholonically, each tholon has its own instance of awareness (consciousness), intelligence, and field, and that field is a parent field within which the child tholons, with their own subfields, are created. Thus, every field, at every level, influences and induces fields in its proximity to change in some way and to some degree.

We noted how the movement of energy can create magnetic fields. These magnetic fields are a form of energy, so just as the movement of electricity can form a magnetic field, so too can a magnetic field form electricity. This applies to tholonic fields, such as fields of awareness and intention, suggesting that the movement of intention can induce changes in awareness, and changes in awareness can induce movement of intentions. No energy (or A&I) is being created, just changed from one form to another. We can see this in our daily lives by examining how our intentions and awareness constantly interact. My intention to read a book will induce my awareness towards reading that book. When my intention to read is reduced, my awareness will drift away from reading. Awareness and intention exist together, just like electricity and magnetism.

Applying this to the thologram, at the "top" we have an elementary field, which exists between the 1st two poles created by the primal dot and which have the properties we have labeled *Definition* and *Contribution*, and which instantiates in various forms depending on their context. Every child field is induced by its parent (and ancestors and peers), and the parent is induced by the child (and all descendants and peers). Accordingly, the thologram is one large field of ever-embedded fields, all inducing one another, all of which are expressions of primal awareness, all interacting with and dependent on one another.

There are many legends, stories, and theories, ancient and modern, attesting to the power of awareness. We won't get into them here other than to say that if reality and awareness are intertwined, then it would be reasonable to expect that just as reality has an effect on awareness, awareness can affect reality, especially as awareness is an integral part of reality and not simply an effect of evolutionary causes. This is easier to accept when speaking of human awareness, but how does this associative relationship manifest in other instances, such as plants, rocks, planets, and elements, all of which are some expression of primal awareness?

Morphic-Fields

As late as the 1950s, some scientists and most people in general thought that plants and even animals were little more than biological machines and that outer-space was just a bunch of hot and cold balls floating around according to Newtonian and Keplerian laws. Since then, we have discovered that plants have "feelings", monkeys can form sentences and talk about their emotions, and the Universe is not only a lot bigger than we thought but there may be countless parallel versions of them. We have seen how everything is connected in one way or another, at least on the quantum level - to name a few changes to our worldview. We are moving ahead in our thinking and understanding at an incredible rate.

Sadly, some of the old guard is a tough bunch that is doing their best to keep us from making progress, not unlike the 9th century Archdiocese. Take the long-time editor of *Nature* magazine, John Maddox, who stated, regarding Rupert Sheldrake's book on morphic-fields:

> *[his book] is the best candidate for burning there has been for many years. Sheldrake's is not a scientific theory. Sheldrake is putting forward magic instead of science, and that can be condemned, in exactly the language that the Pope used to condemn Galileo, and for the same reasons: it is heresy.* [177]

Yes, he actually cited Pope Paul V's condemnation of Galileo as a defense on the grounds that *heresy* is the real crime. This sounds eerily similar to "swarming with worms of heretical perversity."

This alone should paint a pretty clear picture that modern science, for all its breakthroughs in understanding and progress, has become a modern-day religion in the hands of the truly dogmatic that seem to be in charge all too often. Dr. Richard Feynman himself noted this when he stated:

> *We live in an unscientific age in which almost all the buffeting of communications and television, words, books, and so on, are unscientific. As a result, there is a considerable amount of intellectual tyranny in the name of science.* [178]

So, why are the modern-day version of Tomás de Torquemada (Grand Inquisitor in the Spanish Inquisition of the 15th Century) and his ilk impaling the venerable and brilliant Rupert Sheldrake on the spikes of modern mainstream scientific dogma? Well, it seems that Sheldrake, a Cambridge professor who studied at Harvard, was onto something with his *Morphic-Field Theory*, and it rattled their cage. Perhaps they feared that the "worms of heretical perversity" would begin to devour the carcass of their failing scientific worldview.

Sheldrake's Morphic-Field Theory, which he described in his 1981 book, *A New Science of Life*, posits the existence of organizing fields which are systems that self-organize, create structure, and have patterns. Morphic-fields are not a type of mass nor an energy but are organized *by* energy. This would make it a pattern or structure. Morphic-fields are described in the same way as holarchies in that they are made up of parts, which are, in turn, parts of wholes themselves. At each level, the morphic-field supports the structure of its whole and organizes its parts.

Morphic-fields described (in 50 words):

> *...located invisibly in and around organisms, and may account for such hitherto unexplainable phenomena as the regeneration of severed limbs by worms and salamanders, phantom limbs, the holographic properties of memory, telepathy, and the increasing ease with which new skills are learned as greater quantities of a population acquire them.* [179] ***~Rupert Sheldrake***

A more complete description is as follows:

> *A morphic-field is a field of energy that imposes patterns on otherwise random or indeterminate patterns of activity. Morphic-fields transmit information via morphic-resonance, which is the influence of previous structures of activity on subsequent similar structures of activity organized by morphic-fields. Morphic-*

> *resonance has the capacity to store and transmit information and therefore it can act as a memory bank for any self-organizing group, such as self-organizing systems; molecules, crystals, cells, plants, animals and animal societies. Each member of a group can contribute and draw from this memory bank.* ***~ excerpt from Rupert Sheldrake's letter to John Horgan, writer for Scientific American*** [180, 181]

The idea of morphic-fields was an epiphany that Sheldrake had in 1971 as a way to explain how living things knew how to grow when that information was not stored in their genes.

The first known example of a morphic-field test goes back to 1920, long before Sheldrake came up with his theory, when Harvard professor William McDougall proved that children of mice that have learned a maze could navigate the maze much faster. After 20 generations of maze-running mice, the next generation could run the maze 10 times faster than their pioneering ancestors. As genetics could not account for this transference of knowledge, it must have been something else; something science didn't know about. To investigate this mystery, a team in Edinburgh set out to prove McDougall's test was pure poppycock. Unfortunately for these researchers, their 20th generation mice knew how to reach the target on the first try.

They had no idea of morphic-fields back then. If they did, they would have known that the Edinburgh mice benefited from the knowledge of the Harvard mice, even though they were thousands of miles apart, thanks to the intra-species transference of information via the morphic-field/morphic-resonance. There have been many other examples like this over the last 100 years.

On a more human level, we can see how Leibniz and Newton both came up with the concept of calculus at the same time, and cubic equations, considered to be one of the most significant milestones in mathematics history, were simultaneously discovered by Nicola Tartaglia and Scipione del Ferro in the 16th century.

The way this morphic-field information is transmitted is via morphic-resonance, according to Sheldrake. All members of a group that share a morphic-field have access to the morphic-field info because they naturally resonate with that field, not unlike how we can pick up radio waves when we have a crystal that resonates with the transmission frequency. Dogs share information with dogs, humans with humans, etc., but a bond between a dog and a human creates another morphic-field they share. Sheldrake shows examples of this in how dogs know when their owners are coming home and start waiting for them by a door or window. [182, 183]

Because of their ability to transmit data across time and space, morphic-fields have been considered for communication in long-distance and interstellar travel [184, 185]. Morphic-fields may also be capable of creating self-organizing systems within AI.

Much more research is needed in morphic-field and morphic-resonance, but this is slow in coming in the current environment. [186] Others have been working on similar ideas, such as theoretical physicist Lee Smolin, with his concept of the *principle of*

precedence [187], which states that the history of measuring a particular quantum event will determine (or affect) the future measurements of that same event when it is measured. Unfortunately, unlike the world of physics, biology has become more dogmatic in the 20th century.

A small but hugely significant detail is that morphic-fields originate outside of space-time. They exist in the realm of thought, awareness, or consciousness (or all 3). As we currently understand, information cannot travel faster than the speed of light (in 3D reality), but does this apply to awareness? According to the tholon model, no, it does not, because reality and the Universe *is* Awareness, and Awareness is 0-dimensional, and therefore transcends the limitations of space-time. However, consciousness, a contextual instance of Awareness, may well be limited by space-time. Perhaps all we need to do to transcend space and time is to become ONE with the 0-dimensional singularity of infinite Awareness and Intention. How hard could that be (assuming we don't vaporize ourselves by plugging into the source of pure energy)? This might explain how, as Buddha claimed in the Majjhima Nikāya scripture, he could remember all his lives going back 90 eons (with 1 eon being the solar system's lifespan). In the meantime, there has been some research on awareness and morphic-fields [188], but it's scant, and the results are far from clear-cut.

Beyond the Body

Many people believe that one's consciousness can, with practice, travel outside of the body and this physical reality. This is typically called an *Out of Body Experience* (OOBE) or *Astral Projection*. Mainstream science is not a fan of this idea. *Scientific American* suggests that OOBEs are caused by inner ear problems [189]. This view, although not surprising, is troubling, considering that some real research on OOBEs [190] has shown extraordinary evidence, such as a subject, while out-of-body, being able to read the letters "P = 10^{-5}" or "25132" that were written on a remote piece of paper [191]. Practitioners have reported faster-than-light, instantaneous "travel", which would be possible in the 0-dimensional space of Awareness.

In the world of metaphysics and parapsychology, there is the concept of "soul travel" or "astral projection", which is a practice where the consciousness of the practitioner can, via their "souls" or "astral body", disassociate from their physical body. While Western thinking dabbles in entertaining such possibilities, mainstream thought is that such experiences are a form of a dissociative, depersonalization, or neurological disorder. Eastern thinking is quite different, probably because the Buddhist scriptures that explain this phenomenon quite specifically have been accepted for thousands of years. For instance, here is a paragraph from the discourse of "The Eight Knowledges" extracted from the Majjhima Nikaya written by Buddha between the 2nd and 3rd century BC.

> *When their mind has become immersed in Samadhi like this, they wield the many kinds of psychic power; multiplying themselves and becoming one again; going unimpeded through a wall, a rampart, or a mountain as if through space, diving in and out of the earth as if it were water, walking on water as if it were*

> *earth, flying cross-legged through the sky like a bird, touching and stroking with the hand the sun and moon, so mighty and powerful, controlling the body as far as the Brahma realm. ~Buddha* [192]

The discourse goes on to describe many more seemingly impossible and miraculous phenomena. From the tholonic perspective of consciousness, such abilities are possible and inevitable. If consciousness is a contextual instance of Awareness, then changing one's context will change how Awareness will instantiate. Humans have the ability to intentionally alter their context. We do it all the time through meditation, competition, investigation, exploration, education, and several other ways, including physiological and neuropharmacological means. With a bit of effort, research into these new areas of understanding can be found, but, in general, science is not well equipped to study the mechanics of awareness or any non-material phenomena.

Fields of awareness, such as morphic-fields and tholonic fields, while being able to instantiate in the material world, are not limited to the restrictions of the material world, and it is inevitable that we, as instances of awareness, will discover them.

Key 73: Tholonic and Morphic-fields can transmit and store information.

Key 74: Tholonic-fields are not limited by time and space.

Tholonic-Fields

The idea that morphic-fields can be formed as a result of a self-organizing system, as Sheldrake describes them, is limited to systems that exist and systems with real-world instances, such as species, societies, etc. Ideas exist and are self-organizing, so why wouldn't morphic-fields apply there? Well, they would, but with a difference. In the morphic-field model, the instantiated members of a specific morphic-field are receivers and transmitters of information within that field. Therefore, the reception and transmission of information among the member of the morphic-field depend on the contextually limited abilities of the members of a morphic-field, such as a species. There are over 200,000,000 species of life on the planet, suggesting that at least that many morphic-fields are interacting with each other in some manner. Suppose we applied the morphic-field model to ideas as archetypes not limited by their instances. What is receiving/transmitting information within and in-between the morphic-field that *ideas* are a member of?

Sheldrake implicitly answers this question by describing the morphic-field as "*organizing fields which are systems that self-organize, create structure, and have patterns*". This description is that of a form of intelligence. Therefore the morphic-fields that share a morphic-resonance or morphic-cloud are capable of transmitting and receiving between themselves, not only with their instances. Tholonically speaking, this would also mean that the archetypes, the tholons, are also both transmitters and receivers of information.
The tholonic view also considers the material reality to be a contextual expression of

an archetype. In the morphic-field model, humans, dogs, and ants are forms of life that resonate with fields. In the tholonic model, humans, dogs, and ants *are* those fields in a material context.

The morphic-field theory attempts to explain why and how ideas simultaneously spread across a morphic-group, such as humans or lab rats. Morphic-fields are also capable of inter-group communication, such as between humans and dogs, as cited in Sheldrake's book "*Dogs That Know When Their Owners Are Coming Home*".

In the tholonic view, these same phenomena exist between tholonic archetypes, and these tholons/archetypes can directly communicate without having to go through any of their instances. That interaction can also include negotiation via cooperation and/or conflict or result in a redefining or contributing of both archetypes. Tholons can battle, form alliances, trade, aid, lie, extort, and even destroy other tholons. This understanding better explains the wasp/roach or honeybee/human relationship and sheds light on everything from religion to economics.

At the time of this writing (August 2020), within the social arena, which includes economics, politics, government, culture, civil rights, and so much more, we are seeing some extraordinary movement of tholonic activity in the social realm as a result of the global pandemic and subsequent lock-down, itself a creation of a tholonic intention, which will alter all aspects of society. As the activity increases, a wider array of tholons will be contributing to the cause and effect of the situation-at-large to the point where concepts unrelated to health, government, and economics will come into play and be changed in ways we may not be able to imagine. Of course, what we are seeing today is itself a child of the changes that have been happening for hundreds and even thousands of years. It might seem obvious that events like famine, war, or disease would be very disruptive. While that is true for us poor human instances, on the tholonic level, they are business-as-usual. Far more disruptive (on the tholonic level) are the new classes of tholonic archetypes that never existed before and are changing reality. A few examples of the many emerging archetypes might be:

- Global communications (19th century)
- Quantum/Relativity theory (Early 20th century).
- Logical Machines (1869)
- Access to space (1924).
- Nuclear science (1906)
- Digital information (1948).
- Genetic engineering (1970s).
- Artificial Intelligence

These are just some of the changes that have, and will, permanently and radically alter the direction of growth for many archetypes and their instances, and consequently, the fabric of reality and our understanding and perception of it.

It is a small step from here to presume that with even a little understanding of reality, the tholonic model could easily "predict" future discoveries. This has already happened to some degree. In one of the numerous cases of self-learning AI, the AI agent

scanning only the words (which are themselves tholonic archetypes) of documents combined the concepts of “chalcogenide”, “optoelectronic”, and “photovoltaic applications” to create a new concept of a thermometric archetype that the AI identified as $CsAgGa_2Se_4$ [193]. That was in 2009. In 2012, that compound was discovered.

Ideas

The natural ordering resulting from the movement of energy is obvious (we hope). For this to apply to ideas, we would have to accept that ideas themselves use, transmit, or transform energy. There are 2 arguments to support that they do.

- An idea cannot exist in a state of total nothingness. If an idea exists, then it must do so somewhere on the spectrum of some duality. Therefore, it must have some kind of energy passing through it.
- An idea or concept has coherence, or low entropy, and represents a product of “work” or the movement of energy, which produces fields and oscillations of that energy’s movement.

Key 75: Tholonic-fields are the fields generated by the movement of energy through an archetypal concept that has been discovered or created.

Morphic-fields are the instantiations of tholonic fields as expressed by the instantiations of that archetype. This brings us back to the question: how and where is all this information that is being accessed stored? How does a tholon know the limits of its scope? How does it access the information needed to inform its intelligence? How does it “remember” context or “learn”?

The first place to look for an answer is in the manner that tholonic instances have devised to store and transmit information, and the obvious choice of instances is *humans*. Let’s look at how humans store the information we have collected from the conceptual world. We may discover analogous processes that apply to tholonic and morphic fields.

And how *do* we store that information? We invent an abstract symbolism, apply meaning to it, call it language, use that language to record those symbols, and then, most importantly, teach our children how to decode them. This shares some similarities with the process the honeybirds have developed and maybe even the dopamine-injecting wasps. However, the difference is that they do not (appear) to have a way of recording or sharing their collective knowledge as humans do. Perhaps this is because humans have lost touch with this information field, as suggested by Jaynes, so they had to invent their own techniques like writing, talking, the Internet, cloud storage, etc. Perhaps we may not be aware of the symbolism being used by our *field intelligence* to collect, store, and transmit information, or maybe we are aware of it but don’t know how to understand it. Because we do not know or have not been taught how to recognize or understand these symbolic messages, we have to assume they could exist anywhere and everywhere.

Key 76: We don't know what we don't know.

Let's look at some of the more likely candidates of how and where we might find and access this *field intelligence.*

Telepathy, ESP, or Something

Can we describe this field intelligence as some sort of telepathy? And if so, do we even have any evidence that telepathy exists?

The idea of telepathy has been around forever, but modern science insists it is all pseudo-science hogwash, right?

Not exactly. Not only is there a mountain of evidence to support its existence [194, 195, 196, 197] and even a drug named after it, *telepathine* [198], but the (technology-enhanced) telepathy business is booming!

- Many research projects developing telepathic processes and products. [199, 200, 201]
- U.S. military (DARPA) developing telepathy-based weapons. [202]
- *Elon Musk*, Facebook, and others developing telepathy-based tools. [203, 204, 205, 206]
- Google's *neuroprosthetics* (brain augmentation nanobots [207, 208]) will, according to their director of engineering, Ray Kurzweil, not only result in human hybrids by 2030 [209], but will "make us godlike" [210] (we are assuming these godlike powers include telepathy, ESP, and more).

While it's true that a lot of research and development in telepathy is based on technology-induced telepathy, such as "neural clouds", which will be indistinguishable from current data-clouds, it is still driven by the idea of telepathy. In other words, we believe telepathy is a phenomenon that can be improved upon.

Sheldrake has a lot to say supporting the existence of some sort of telepathy in the documentary "*Scientific Evidence of Telepathy: Documentary.*" [211]

Russel Targ, a former physicist at Stanford Research Institute and author of *"The Reality of ESP: A Physicist's Proof of Psychic Abilities"*, has experimented with telepathy and ESP for some time now. He shows [212] that the scientific evidence for ESP is statistically more substantial than the evidence that aspirin helps reduce stroke. The aspirin test was so statistically significant that the trial had to be called off because it was considered unethical to continue giving test subjects placebos in light of the overwhelming evidence they had collected before the test was even completed. I know it's a rhetorical question, but why are we not seeing this revolutionary telepathy/ESP research all over the news? The evidence is compelling enough to accept that telepathy, in some form, is a thing.

The umbrella “or something” category can cover quite a bit of territory, including lesser-known applications of our sensory-processing skills, such as the ability to smell personalities and emotions[213, 214] or, if you’re a woman ovulating, your superhero-like ability to immediately recognize gay men and hidden snakes[215] (the elongated, legless, carnivorous reptiles, not the metaphorical type, although I suspect research would show significant results for the latter as well). Some humans have a visual sense 100 times more sensitive than the average person.[216] What of the extensive intrinsic nervous system in the heart comprised of clusters of neurons sufficiently sophisticated to qualify as a *heartbrain*? Certainly, that must contain some sort of sensory processing abilities.

Perhaps the most overlooked yet strongest sense we have is what we call our *gut sense*. Considering that our gastrointestinal tract contains 95% of our body’s serotonin, has its own nervous system, and is filled with trillions of microbes sending terabytes of information to the brain every millisecond, microbes that are 100 times in number than the cells in the rest of the body and 10 times the number of cells in the brain, all of which having a significant impact on the brain,[217, 218] one would have to consider the *gut* as a powerful organ with its own senses.[219] Knowing this, perhaps we should start considering what microbes we are exposed to at birth that so dramatically affect our brain growth. Those born under natural conditions are exposed to the microbes of their natural surroundings. How do C-section births and exposure to the microbes of hospitals, urban dwellings, and processed food alter our brain and gut development?

What about the sense that allows blind people to detect a person’s emotions in a photo?[220] What sense was activated by the practice of *merpati putih* (“white dove”) in Mary Yogamaatha, the 9-year-old Indian girl who demonstrated at the 2015 Business Advocacy summit at Capitol Hill in Washington D.C. that she could read blindfolded using only her third eye?[221] How do we use the 6 additional senses identified by researchers at Harvard Medical School?[222]

Our model of 5 senses is quaint, at best, and that is being generous, especially considering it was proposed over 2,000 years ago by the same philosopher, Aristotle, who held back physics for centuries with some of his completely inaccurate ideas about such things as gravity that were proven wrong 1,600 years later by Galileo, and atoms, which were theorized by Leucippus and Democritus 100 years before Aristotle declared the idea as nonsense (just as he rejected the arguments of Philolaus, 470 - 385 BC and the “so-called Pythagoreans” - his words - that Earth, and the entire Universe, revolved around a ‘central fire’). Why do we persist in holding on to such antiquated ideas about something so fundamental to our understanding of ourselves, society, and reality?

Perhaps what we call some forms of telepathy or ESP are quite natural consequences of senses we have that we don’t know or believe we have or choose to ignore. Just look at some of the fantastic senses of some insects and animals as an example of the abilities of their genetic machinery:

- Buzzards can see small rodents from three miles away.
- Bees have a ring of iron oxide in the belly to feel magnetic fields and have eyes that see polarized light.

- A cockroach can detect movement 2,000 times the diameter of a hydrogen atom.
- Elephants have a hearing range of 1 to 20,000 hertz and can also hear with their nose and feet.
- The shark has special eyes that can see electricity.
- When you look at the sidewalk, you see cement and dirt, but that same sidewalk tells a bloodhound of someone who has walked there eight hours ago, what the soles of their shoes were made of, and what brand of cigarettes they smoked.
- Dolphins see sound waves as 3D images.

Key 77: Transcendental or extrasensory forms of communication exist.

We can't leave the subject of "Telepathy, ESP, or Something" without at least a nod to those institutions that have done more research on the subject than any other in the world (outside of the Soviet Union). Who are these pioneers of expanded consciousness? The Central Intelligence Agency (CIA), Army Intelligence and Security Command (INSCOM), Defense Intelligence Agency (DIA), and Stanford Research Institute (SRI). Unfortunately, the millions of dollars spent on their research into telepathy, ESP, and remote viewing was classified (until recently) and had nothing to do with bettering the human condition. Of course, they were seeing how such abilities could be used as weapons of war and espionage. From 1972 to 1995, there were several federally funded projects dedicated to this task with code names like "Senate", "Gondola Wish", "Grill Flame", "Center Lane", "Dragoon Absorb", "Project CF,", "Sun Streak", and ultimately "Stargate".

So, why did they stop their research in 1995 (assuming they *did* stop the research)? Even though they achieved stunning levels of success, the error rate was too large to be used as a weapon, and (thankfully) their weapons of war and espionage needed to be 100% reliable and as close to 100% accurate as possible.

Fortunately, many of the documents from these projects have been declassified. By the looks of their test results, there is absolutely no question they achieved not only miraculous results but created a revolutionary model of reality that apparently worked!

Here are some excerpts from the declassified file CIA-RDP96-00789R001300010001-6 titled "Coordinate Remote Viewing (Theory and Dynamics)"[223] (Images recreated from original for clarity, but not complete. See original.):

> *Somewhere, perhaps in the unconscious mind, there exists what we label "The Matrix". The Matrix knows no boundaries and has no limitations – it contains all information about all things. It could be thought of as omnipotent or you could think of it as a database etc.*

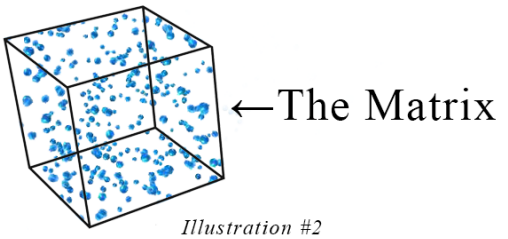


Illustration #2

> *The Matrix has within it "Patterns" – think of these as points within a 3 dimensional box (see illustration #2). the "patterns" within the Matrix each poses and radiates their own energy. This energy is emitted in the form of a signal or "signal line" which is peculiar to that specific pattern.*

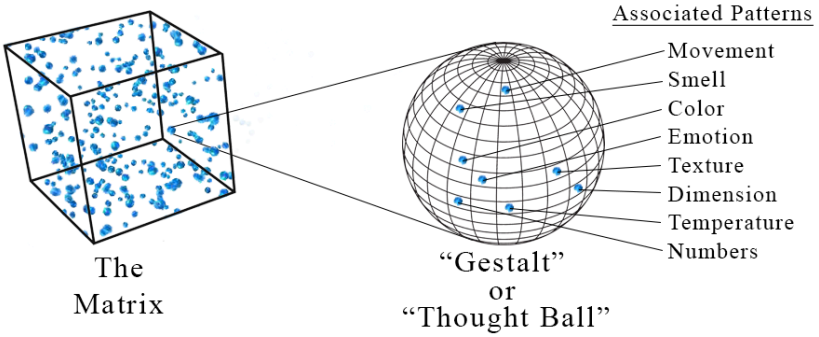


Illustration #3

> *This "pattern" has other names by which it is known – it can be referred to as a "Thought Ball" or as a "Gestalt". A Gestalt can be described as "The Pattern" and all of its associated patterns (see Illustration #3).*

Note: "Gestalt", by definition, refers to the form or shape of something and suggests that the whole is greater than the sum of its parts. In this context, it refers to patterns made up of patterns. Its origins go back to 1912, in Frankfurt am Main, Germany, where psychologists Max Wertheimer, Wolfgang Köhler, and Kurt Koffka proposed the concept in their "Experimental Studies of the Perception of Movement" ("Experimentelle Studien über das Sehen von Bewegung").

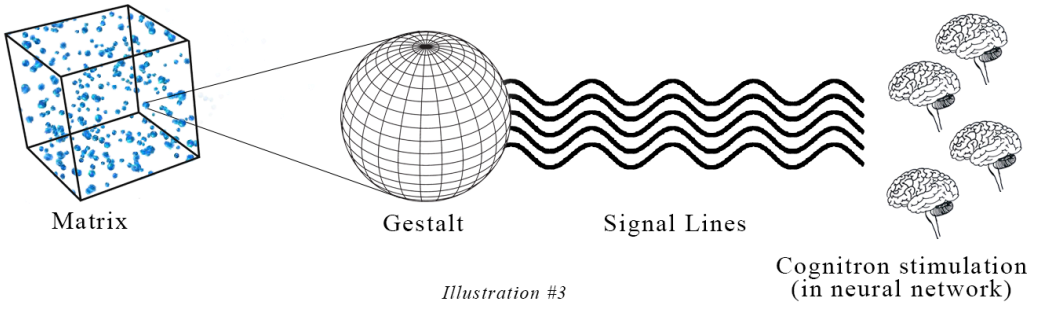


Illustration #3

> *"Cognitrons" are a pattern product, created by the interaction between neurons and synapses – after either a physical or emotional event. Cognitrons exist in the unconscious mind and can exist as separate patterns or as clusters of related patterns (see Illustration #3)*

Note: "Cognitrons" might sound more like a giant alien Autobot commanded by Optimus Prime in the unending battle against the evil Decepticons, but the term comes out of the field of Biological Cybernetics and refers to "A self-organizing multilayered neural network" [224]*. The cognitron has also given birth to the neocognitron, a hierarchical layering of cells specifically dedicated to pattern recognition* [225]*.*

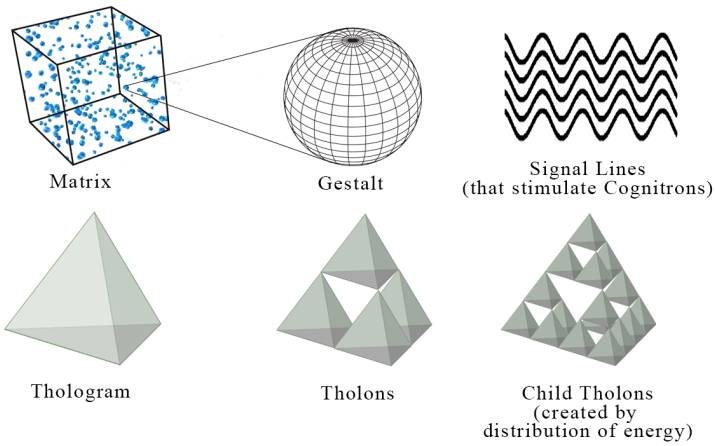
As an aside, personally, I strongly suspect that The Wachowskis Brothers (The Wachowskis Sisters after 2013), being the Edge Lords that they are, were familiar with this document when they were choosing the name for their 1999 movie "The Matrix" that questioned the nature of reality. Perhaps it was even a source of inspiration. Compare the descriptions above:

> *The Matrix knows no boundaries and has no limitations – it contains all information about all things. It could be thought of as omnipotent, or you could think of it as a database, etc.*

… with the (much more dramatic and plot-driven) description *Morpheus* gives to *Neo*:

> *The Matrix is everywhere. It is all around us. Even now, in this very room. You can see it when you look out your window or when you turn on your television. You can feel it when you go to work, when you go to church, when you pay your taxes. It is the world that has been pulled over your eyes to blind you from the truth.*

More to the point, this model has concepts and led to results that are shared with the thologram.



The difference is that the thologram is a self-organizing/self-replicating homogeneous/holistic process where the instances exist *within* the tholon. The "matrix" is heterogeneous processes that connect instances which appear external to the receiver and does not appear to be self-similar/self-replicating.

There is so much evidence[226] collected by the CIA, INSCOM, DIA, and SRI under the most stringent conditions and so much anecdotal evidence from legitimate sources that it is difficult to imagine any legitimate scientist not taking it seriously, but many do not.

Clues

Telepathy or otherwise, it's a safe bet to say that some form of transcendental or extrasensory form of communication exists, and this might be a way to access tholonic data. It's the specifics of it that seem to be elusive. Proving such a thing is similar to asking me to prove that Australia exists. I know many people from Australia, I can find Australia on a map, and I know of Australian politics and history. Still, all of that is anecdotal, as I have never been to Australia. If you asked me to prove Australia's existence by the strictest scientific standards, I could not without actually going to Australia. All I could say is I have a lot of evidence from trustworthy sources. A real-world example of this same question is, "Is there life after death?". I have never died, so I can't say, but many thousands of people have died and returned with detailed reports of the "other side", and trusted sources have investigated this phenomenon, and all agree, yes, there is life after death[227]. Therefore, from a rational perspective, it would be no more reasonable to deny the existence of the "other side" in light of the evidence than it would be to deny the existence of Australia.

This is the literal definition of an *axiom*, which is "A principle accepted as true without proof". Examples of scientific axioms are "Every effect has a cause, and every cause has an effect", "Reality can be understood through reason", "The Universe is knowable", "The Universe is governed by immutable laws", "A shared physical reality exists for all local observers", to name just a few of the many. None of these are provable, but they are assumed to be true. Ironically, the word "axiom" is synonymous with "faith" (but sounds much more "sciency"). The underlying foundation of both axioms and faith is *trust*. In a way, science is the ultimate conspiracy theory, as it only makes sense if everyone accepts the unprovable axiomatic truths that science depends on. On the other hand, faith requires no acceptance other than one's own. One might even consider the scientific definition of "real" to be axiomatic, as, while there may be proof, that doesn't make it true; it only makes it acceptable, as we pointed out in the "cow in the field" problem.

Analogs

What mechanism does transmitting and receiving among animals, humans, plants, and rocks? After all, they, too, have a form of awareness and intelligence. Their collective mind? Their energy fields? Their physical structure?

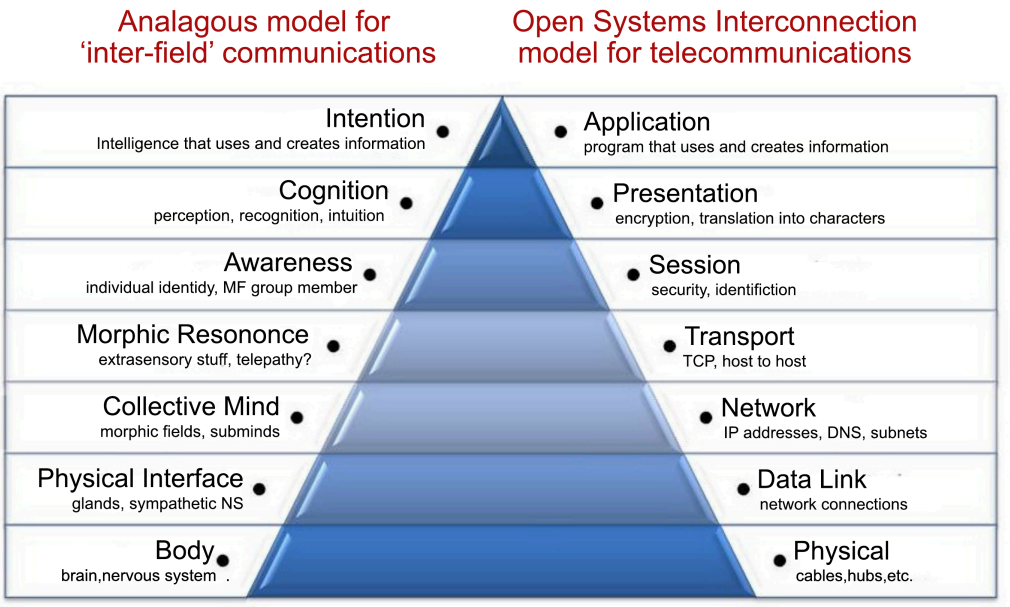
Dawkins suggests that memes are the non-genetic manner in which information is passed on. He also strongly disagrees with Sheldrake's morphic-field hypothesis. Unfortunately for Dawkins, memes cannot explain test results that morphic-fields can. Additionally, morphic-field theory not only has room for memes but can explain a way that memes can spread, so Sheldrake: 1, Dawkins: 0.

We don't need to know the specifics of *what* is being transmitted just yet. Let's consider the *how* by looking at how we humans have learned to send and receive information.

When you want to send something somewhere, how is that done? Maybe you use a postal service or your computer network. In either case, you are collecting the information and delivering it *not* to the final destination but to a service or infrastructure that does the delivering. This is the case with radio, television, electricity, and even nature if we consider how seeds, an instantiated form of information, can be transported around the world via air, water, hiking boots, animals, and, in the case of mushrooms spores and viruses, intergalactically via meteors and space-wind. These "seeds" are not only carriers of DNA but possibly information or messages from off-world intelligence, according to some researchers[228], including Dr. Francis H. C. Crick, the co-discoverer of DNA, who, in his paper, *Directed Panspermia*[229], hypothesized that DNA originally arrived from space.

For example…

It is easy to imagine applying the well-developed telecommunications model that we currently use, called the *Open Systems Interconnection* model, to a model of information-sharing among various forms of intelligence.



To be clear, we are not saying that this is how it works, nor are we saying this is *not* how it works. We suggest that we might find new perspectives if we apply the models we have developed based on natural laws to things we do not yet understand. In this case, for example, we see that the physical body and intelligence are at the opposite ends of the pyramid, implying that the brain/nervous system is more of a receiver/transmitter rather than a generator, as creating new information requires intention, cognition, and intelligence. This is a radically different concept than the current mainstream and antiquated idea that the mind, consciousness, and intelligence *must*

arise out of brain activity. Other successful models we currently use today could also be applied to things we do not yet understand, at least as a starting point of investigation.

Still, none of this addresses the specifics of where the information is stored or transmitted from.

Collective Memory

The idea that a field intelligence is in some way an extension of the idea of the *collective mind* or *collective consciousness* was formalized to a great degree by Carl Jung's idea of a collective subconscious and collective memory, although it may be more accurate to describe the idea of a collective unconscious as a primitive understanding of *field intelligence*. This is still a very fertile area of research across many disciplines. [230]

Sadly, no theories explain where and how long-term collective memories are stored. In the West, the idea of collective memory has been around since the early 20th century French sociologist Maurice Halbwachs coined the term. His hypothesis on how collective memory was stored and transmitted is extremely unspecific but generally depends on human-to-human transmissions, similar to Dawkin's theory on spreading memes. Given that Halbwachs was a student of Emile Durkheim and a devoted Marxist, one has to question his entire premise of a "collective", especially in light of his laughably ridiculous claim that human memory can *only* function in a collective, and then goes on to give examples of his hypothesis of collective memory by comparing the "collective memory" of the bourgeoisie, religious and the working class, which may be a valid example, but is highly myopic and undoubtedly contaminated by confirmation bias. Still, he did coin the term, even if his premise was infected by a virulent and parasitic ideology (not unlike the Emerald Wasp).

Current thinking still revolves around cultural expression as the primary way collective memories are transmitted; dance, stories, monuments, etc. These are certainly reinforcing factors, but this idea alone cannot explain Man's collective memory of "the whole history of the human race", as Jung claims the source of our fear of fire, falling, and social status, to name just a few. Some of these memories are epigenetic/genetic, such as being born with the fear of loud noises, which comes from the memory that loud noises are generally a harbinger of something that's bound to make life more difficult, but can all our collective memories be stored in our DNA? Perhaps that is what the 75% of our junk DNA holds (recently upgraded from the previous 98% junk), or perhaps we don't yet understand its function. Maybe the junk DNA is more of an antenna than a transcoder? We have no idea, but whatever it is, could it account for storing "the whole history of the human race"? This seems very unreasonable.

One place worth exploring is where and how these patterns exist in the epigenetic transmission of experiences and memories passed on to descendants. Why epigenetics? Because epigenetics appears to be one of the more effective ways contextual information is learned, stored, and passed on. In one of the classic test cases, the descendants of mice trained not to like the smell of cherry blossoms had an aversion to the scent of cherry blossoms [231]. Rather than altering the genetic code, epigenetics

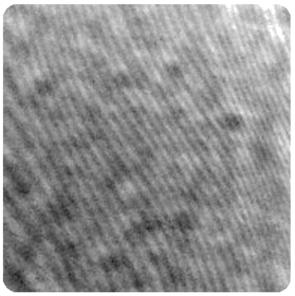
describes how a gene expresses itself, showing how how DNA can be modified by non-genetic stimuli, like fear, love, environmental preferences, and even dreams, suggesting that what we inherit may go far beyond the human traditional genetic traits.

It will be exciting and informative to see how the Information Age will alter our collective consciousness, memory, and tholonic archetype[232], as its effect will be as profound as the discovery of fire.

Engrams

Another candidate is how the brain creates and stores memories. We have developed the concept of an *engram*, which is how biochemical and biophysical processes store our response to external stimuli. The engram, first described by German Zoologist Richard Serman in the early 1900s, was based on what he called the *mnemetic principle*, which states that the imprint made in the nervous system (including the brain) can, when stimulated by external stimulus, reconstruct the experience. This is a very holographic idea in that holograms reconstruct imagery by illuminating a previous record of that imagery. The images below demonstrate how the "memory" of the image of a 3-dimensional cat can be stored on a 2D surface of holographic film, but looking at the film, we would have no way of knowing that there is any information there, let alone the information that describes a 3D cat.

As it applies to memory, an important technical detail regarding holograms is that many images can be recorded on top of each other, each with a different angle of illumination. All those images can be reconstructed simply by changing the angle of the hologram when viewing. This is why and how a holographic memory cube the size of a small closet ($5m^2$) can store every word ever spoken or written by all humans.[233]



Surface of holographic film
(composed of silver salt crystals and geletin)

Resulting image when illuminated

This imprint, or "mnemetic trace", so named after the Greek muse of memory "Mneme," is also a precursor to Dawkins's "meme," as the meme is a cultural version of an engram.

The 50 years of research following Serman's hypothesis of the engram boils down to, for our purposes:

> 1. memories are not localized but are instead distributed within functional areas of the cortex and

> 2. memory traces are not isolated cortical connections between inputs and outputs.[234]

Might we see these same characteristics in our collective memory technology, otherwise known as the Internet? Perhaps. Decentralized and distributed information networks, such as Bitcoin's Blockchain, TOR (The Onion Router), and IPFS (Interplanetary File System), are probably early stages of such a thing. The irony of the Internet is that when DARPA originally developed it, it was designed to be much more decentralized than it is today to the point where it could withstand a nuclear attack and continue operating. Today, much of the decentralization has been removed by those with the authority to change the Internet to fit their preferences. Most authoritarian governments, and England, have Internet kill switches[235]. Allegedly, the U.S. had one installed during the Obama administration, but we'll never know for sure as the U.S. Supreme Court said the government is not required to confirm or deny the claim. This is not surprising given that memory is what connects the past to the present and determines the direction of the future, so whoever controls memory, personal or collective, controls the past, the present, and the future.

Suppose we extrapolate these ideas when looking for how field memory works. In that case, we might want to start with the presumption that *field memory* is decentralized and distributed within the medium of the field. What and where is this medium? Anywhere there is energy, as the field *is* energy. However, when referring to the context of instances as opposed to the pure archetypes, the instances themselves would be a part of the medium. Field memory is not stored as discrete quanta of information but rather as an organized pattern of otherwise dis-integrated "particles" of information, which we refer to as data. Were we to see this data alone, it would appear as chaos. When seen from a different perspective, decoded or "re-stimulated", it may appear as information.

Modulation

Another model to look at might be the way we transmit information by modulating the amplitude or frequency of a wave, similar to how TVs, radios, and acoustic modems work. If we accept the idea that all energy moves in cycles and waves, including the energy of ideas, then perhaps those waves are also modulated in some way with information. As suggested earlier, there are waves we either don't recognize or don't consider as waves. For example, is it possible that the "waves" from the "cycles" of the moon or the Arctic Tern could be "modulated" to carry information? It sounds crazy, but we know that brain waves encode information (possibly *rules of behavior*[236]) as time codes[237], that light can store quantum memories[238], and that the same waves we use for communication are the same waves that have filled the entire Universe since the Big Bang[239]. Since the discovery of gravitational waves, we have also been looking into how we can transmit information in that medium [240]. Is it possible that these waves are modulated with information, making the waves both the carrier of information as well as the storage medium? Considering how little we know about the Universe, Reality, and Everything, these "crazy" ideas may not be *that* crazy.

Like my grandmother used to say, “when you can’t find something, you need to look everywhere.”

Dark-Matter

One candidate is dark-energy/dark-matter.

Before I describe this idea, I want to make it very clear that I am not a cosmologist, physicist, or scientist of any kind, so this idea may be ridiculously naive and laughable to anyone who is knowledgeable on the subject. That said, let’s give it a whirl.

Dark-energy occupies 70% of the known Universe, can’t be directly observed, and emits no light or energy. Dark-matter occupies another 25%, and the measly remaining 5% is the matter we can see. Dark-matter can have dark-electrons and dark-protons, and there is even dark-chemistry (and maybe dark-tholons, like the virtual ones?). dark-energy also produces dark-electromagnetism and dark-electricity. Dark-matter does not interact with “regular” matter. In fact, there are (believed to be) dark-galaxies, which is the galaxy of dark-energy/matter superimposed on a galaxy of “regular” energy/matter. In short, everything that exists has a “dark” clone that we can’t detect. What better medium than dark-energy is there that could collect information from every scale of reality?

Dark-matter/energy is not just some weird thing we kind of guess is there. Evidence suggests it forms the structure of the entire Universe. Still, all we really know about dark-matter is that it exists, exists everywhere, and interacts with gravity, one of the 4 fundamental forces of energy. This makes gravity the nominee for how the information is transmitted between dark-energy and the “regular” energy of our reality. Perhaps some entanglement is involved with dark-energy, allowing information to travel faster than the speed of light.

Dark-energy is quite elusive, as we can’t detect it or measure it, but we can see its effects in the expanding Universe, as dark-energy seems to be continually being created (like some sort of dynamic memory system that keeps expanding to accommodate the exponentially increasing storage requirements of an expanding Universe?). Perhaps there is a relationship between extrasensory phenomena and dark-matter/energy in some way?

Has anyone tested this? I have scoured the Internet looking for such research and could find nothing. However, I did run across this very interesting post from one of the senior members of Cambridge University’s Institute of Continuing Education, who posted the following:

> *Subject: Can quantum dark-energy explain telepathy?*
>
> *Telepathy and quantum entanglement seem to match each other in that a communication connection exists, but no tangible connection. Could there be a hitherto unknown dark-energy particle produced by electrical impulses in the brain? Could it be that entangled particles of this dark-energy are shared? If*

> *a plasmon circuit in the brain creates patterns of these dark matter particles, based on thoughts and ideas, do people with the shared particles share the same patterns of thoughts and ideas? How long-lived are these particles, how long do they maintain patterns, and what might be the mechanism for transfer? These particles may be exchanged through quantum molecular tunneling, allowing a brain to transmit them outside of the head, and a person with a corollary quantum molecular tunnel for reception to readily receive the particles. Persons sharing close and personal spaces may be more likely to transfer these particles to each other such as twins, relatives, friends, and even enemies. It may be that these particles are long-lasting and this may allow objects to be imbued with the dark particle patterns, allowing a sensitive to read a person through the object. It may be that wherever a transmitter goes the location they were at is imbued with thought patterns of their experiences. The implications of such a mechanism for telepathy imply this process may be amplified by electronics to increase the strength of transmission and reception. It also implies that we could control electronics through the use of telepathy.* [241]

There were no replies.

In June 2019, University of Portsmouth, U.K, physicist Melvin Vopson published a paper titled *"The information content of the Universe and the implications for the missing Dark-Matter"* [242], wherein he details the *"The mass-energy-information equivalence principle"*. The gist of this theory and principle is that not only is information the 5th form of matter, but what scientists have been erroneously referring to dark-matter *is* this 5th form of energy!

This theory is not mere speculation. Vopson has performed tests that anyone (with the proper equipment) can replicate. And what do the tests show? Information has a tiny, tiny amount of mass; 2.91×10^{-40}Kg/bit, exactly. Applying that value to the size of DM in the Universe results in 2.59×10^{82} bits of information. This is quite close to the 10^{82} atoms in the Universe, as mentioned earlier.

If dark-matter is actually information, the 5th form of matter, then certainly this is the most likely candidate for where all this field information is located.

How does this theory fit into the tholonic model? Surprisingly well!

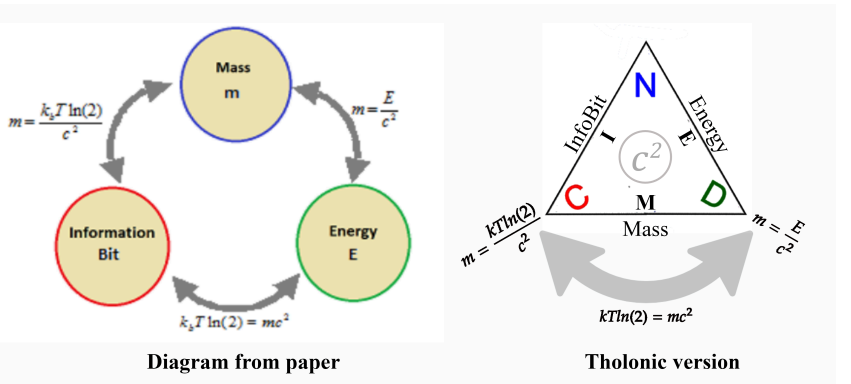


Diagram from paper **Tholonic version**

The similarity between the 3 properties of both is astounding. You can see the formulas follow Newton's laws, and, in tholonic fashion, the qualities of ÷ define the 2 corners of the CD spectrum, and that of × define the CD spectrum itself. It also aligns such that *mass* is the child of the N-source, which implies that mass is the instance of energy, which we know is true. Why are the values of *energy*, *mass*, and *infobit* mapped to the sides of the tholon and not the N, D, C corners? Because this is the holarchic, not the tholonic format, as explained in chapter 7, "Structure":

> *The primary reason the properties of movement and energy are the key points in a thologram rather than the instantiated elements, as in the holarchy, is because movement and energy are consistent at every level of creation.*

Mass and *infobits*, in this case, are more like instances than they are like the flow of energy, at least in relation to the formulas that defined their existence. Even *energy* can be an instance in this context if we consider it to be an instance of the prime N-source of A&I. In practice, it doesn't make a big difference which way they are aligned as the same patterns emerge.

The reader has probably noticed that the ***kTln(2)*** equation can be replaced with the ***E*** from $\boldsymbol{E=mc^2}$. What is that equation? It represents the kinetic energy at a certain temperature (the ***kT*** part, the Boltzmann Constant applied to temperature because higher/lower temps mean higher/lower kinetic energy). The ***ln(2)*** represents the exponential growth or decay over time (remember from chapter 8, "Instances", that ***ln(x)*** allows you to **plug-in growth/decay and get the time** it would take to reach amount *x*). In short, ***kTln(2)*** is another way to say ***E*** for a specific context (of time and temperature).

Related, in some way, is the fact that information is carried in the magnetic part of the electromagnetic field and that the magnetic field only exists if there is a movement of energy. If infobits have energy and mass, according to Vobson, and information is data+energy, according to the tholonic model, then information *must* create some kind of field. Can infobits be induced with such a field, like how a magnetic field can create a movement of electric charges via induction?

This idea that information has mass is also in line with the concept that energy alone is undetectable, unusable, and meaningless if it does not interact with some *thing*, even if that thing is another form if itself (such as mass as energy). Information, being data+energy, is a form of energy, therefore, if information has no interaction with some *thing*, it is also undetectable. Is the tiny mass of information the result of an *information waveform* collapse? Are there other forms of information? Can mass be considered a denser form of information? There are man questions, but we can easily prove that information can not be detected in the absence of mass. In this way we can at least say that information *acts* like it doesn't exist until it is detected.

If information has mass, and information is growing exponentially, then at some point, due to the conservation of energy, the Universe will be nothing but information. Vobson believes this concern has some weight (literally) as he predicts an information catastrophe in about 350 years when the number of bits of information exceeds the

atoms of Earth, which is around 10^{50}, and the power to sustain those bits will be 15.5×10^{15} watts, more than the total planetary power available today. In 500 years, information will account for half of the world's weight. [243]

Gravity

Roger Penrose also suggests that quantum gravity and how it relates to *quantum state reduction*, or the collapsing of a waveform, i.e., the instantiation of a tholon, is the source of consciousness [244]. If the tholonic idea that awareness is the source of existence, then this suggests that consciousness is not only the byproduct of awareness, but it is also an integral part of the instantiation of tholonic patterns as consciousness serves as the expression of awareness necessary to complete the instantiation.

Geometrically speaking, while the infinitely expanding self-similar trigram is a result of the primary 3 states created by A&I, as previously shown, for it to instantiate into a 3D tholon, it requires the 4th composite *white dot* to collapse into the tetrahedral thologram. Consciousness is an instance of awareness and, as such, is composed of all 3 primary dots, e.g., subjective awareness, objective awareness, and the awareness of where they meet.

In the quantum world, it has been theorized that awareness of, or observation of, a waveform causes it to collapse or decohere into a measureable form. Given that we also theorize that it is gravity that causes waveforms to collapse[], can we speculate that awareness and gravity share this same ability to some degree, or that Awareness instantiates as quantum gravity?

If this were the case, than consciousness and gravity appear to be two instances of the same pattern or tholon within two different contexts and, therefore, we might expect to find a 4th particle representing gravity, a *graviton*. In fact, science has speculated that such a particle exists; they just haven't found it yet. There is also some scientifc thought that speculates that "*the global wave function are the true carriers of awareness*." [245]!

Gravity and consciousness both exist as fields, and both are fundamental to existence. If we accept the theory of the Big Bang that mass was created by the infinite gravity of the 0-dimensional singularity, then gravity may be the first instance of A&I which created matter. As gravity is concentrated via matter, what is it that concentrates consciousness in our material reality? As matter is an instance of energy, could energy be an instance of Awareness?

Considering gravity and awareness are both ubiquitous fields that created and binds the entire Universe, it seems like an excellent candidate for exploring field memory.

Is there anything to suggest that gravity and consciousness are two instances of the same expressions in different scopes? Yes, there is.

Let's look at another one of Newton's formulas that describes the gravitational force: $\boldsymbol{F} = \frac{g}{S^2}$, where F is the gravitational force in newtons, g is the gravitational field as it applies to two different masses, and S is the separation between those two masses. And yes, it also looks just like Ohm's law for *resistance* $\boldsymbol{R} = \frac{P}{I^2}$, which, if consciousness and gravity are the same archetype in different contexts, might shed some light on the nature and functioning of consciousness.

If we do the math, we see that Newton's formulas can be applied via Ohm's law, and by doing so, discover that **G**, the gravitational constant, and voltage, are the same archetype.

- **G→V (volts)**: The **gravitational constant**, which is measured in newtons, equates to **volts**, or the pressure of energy inherent in all mass in the form of gravity. **G** is measured as 6.67×10^{-11} m^3 kg^{-1} s^{-2} (newtons per cubic meter per kilogram per-second/per-second).

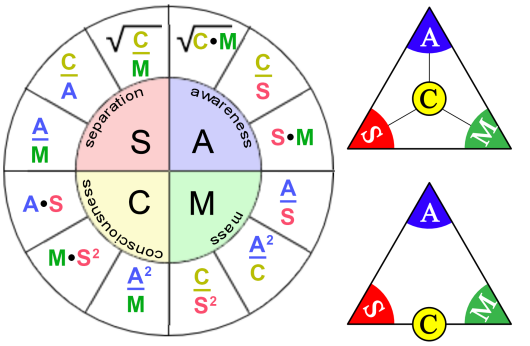
Using the same math, we can apply the following associations as well:

- **g →P (power)**: The **+** equates to **power**, transference of energy over time.
- **F→R (resistance)**: The **force of gravity** equates to **resistance**. This value is the speed at which things fall, so 9.87 m/s^2 here on Earth.
- **S→I (current)**: The the distance between *observer* and *observed* equates to **current**, or the strength of energy. As the distance lessens, the force increases, as **S** and **F** are inversely proportional. *Note: The terms observer and observed are the actual technical terms used, and not terms used here to add validity to the tholonic theory that reality itself emerged from the primal observer, the 0-dimensional concept of A&I, and the observed, the first creation of the A&I.*

There is another correlation as well. The limits of an electrical circuit are defined by the amount of charge, or current (amps), allowed to pass through a system at any given moment. This is typically controlled by a fuse. In the $E=mc^2$ equivalency we saw previously, it is c, the speed of light, that defines the limits of the system we call the Universe, but unlike amps, c can never change. Here, in the gravity example, the defining limit of the system is $\boldsymbol{S}$, the distance between two fields. So, let's replace the equivalent of c (which is $\boldsymbol{I}$) with distance ($\boldsymbol{S}$) and see if there is a reasonable correlation between gravity and consciousness when applied to Newton's 2nd law and tholons?

For example:

Separation (S): The separation in the context of consciousness is the first separation, that of subjective (observer) and objective (observed), so we will correlate the separation of the two masses with these two perspectives.



Awareness (A): The initial blue dot, the N-source, of the tholonic trigram is the first instance of awareness and also correlates to *force*, *potential*, or *volts*, so we will correlate the gravitational constant to the N-source and the 1st state of awareness.

Consciousness (C): As we mentioned before, what we are calling consciousness is an instance of awareness, more specifically, an instance of the awareness of a tholonic archetype. This firmly places consciousness in the position of the child N-source, which correlates with electrical *power* (***P***) and the gravitational field (***g***). This N-state of consciousness emerges within the spectrum of *separation* and *mass*, which are perfect examples of instances of the primal concepts of *nothingness* and *somethingness*. This places the consciousness (***C***), as in instance of Awareness (***A***), along the spectrum defined by ***S*** (*separation*, *nothingness*) and ***M*** (*mass*, *somethingness*).

Mass (M): We are left to correlate electrical resistance with the force of the gravitational field for a specific mass. This fits, especially when we realize that this force's limiting and defining qualities hold everything in the Universe together and in its place. Mass is the source of gravity, or if we accept the theory that the infinite gravity of the singularity created mass, then mass is an instance of gravity.

For the question at hand, what this means is that if there is such as thing as a universal data-store of all the instances of Awareness, then we will find clues to its existence in the differentiation of, or relationships between, instances of consciousness and mass.

This attempt to quantify consciousness and awareness may sound very esoteric or even seem ridiculous to some, but more and more evidence suggests that consciousness is a force of nature and as such, has quantifiable properties.

An example of directly applicable evidence comes from an article written by theoretical quantum physicist Swati Nigam entitled *Gravity As Conscious Force To Resolve Quantum Gravity*[246], wherein she states:

> *According to current science, there is a missing connection between general relativity and quantum mechanics concepts of physics, which is needed to unify them into one, to conceptualize a unified field theory.*

The article then goes on about the nature of the problem, ultimately concluding that consciousness itself is an additional force to the 4 forces of the Standard Model, a 5th force, and one that solves the challenges of the unified field theory in its attempt to unify general relativity with quantum mechanics. Dr. Nigam goes on to say:

> *Thus, we can use the term "conscious force" for gravitational force… **Conscious force is gravitational force**, which is the unidentified 5th force. This force is a synonym for gravitational force, works just like it on all matter entities, irrespective of their nature or position in space, both in macro or micro worlds.*

If Awareness and its instances of consciousness are a fundamental force, then it has a field. Might that field hold clues to *field memory*, perhaps similar to how the memory in the brain might be a *neuronal activity-associated magnetic field*? [247, 248] In any case, there seems to be a strong correlation between consciousness, gravity, dark-matter, and information.

Limits of Consciousness?

This idea that there might be a relationship between consciousness and gravity raises another question: if observation is required to collapse a wave function, can we define consciousness as that which can observe?

First, let's hear what Werner Heisenberg has to say about what *observation* means

> *Of course, the introduction of the observer must not be misunderstood to imply that some kind of subjective features are to be brought into the description of nature. The observer has, rather, only the function of registering decisions, i.e., processes in space and time, and it does not matter whether the observer is an apparatus or a human being; but the registration, i.e., the transition from the "possible" to the "actual", is absolutely necessary here and cannot be omitted from the interpretation of quantum theory.* ***~Werner Heisenberg, Physics and Philosophy, p. 137***

And by "registering decisions", he means any sort of recording of effect that is the result of interacting with the cause, as long as that recording is a time-irreversible process. This recording separates *all that is possible* from *all that is*, or the *Definition* from the *Contribution*. This would imply that if one atom were altered due to interacting with the wave function, it would collapse into a particle, so even a rock could be an "observer". It turns out that the act of observation is more analog than digital, meaning the more something is observed, the more effect it has. In a recent experiment [249] it was shown that:

> *…the greater the amount of "watching", the greater the observer's influence on what actually takes place.*

So, a rock might be able to "observe", but perhaps its "observation" would have only a tiny effect on reality. The experimenters built a machine with variable observation strength levels, and it would be very interesting to measure the observational strength levels of different forms of instances. Are there stronger *observational powers* than what we humans have? This is unknown (I think), but what is known is that machines

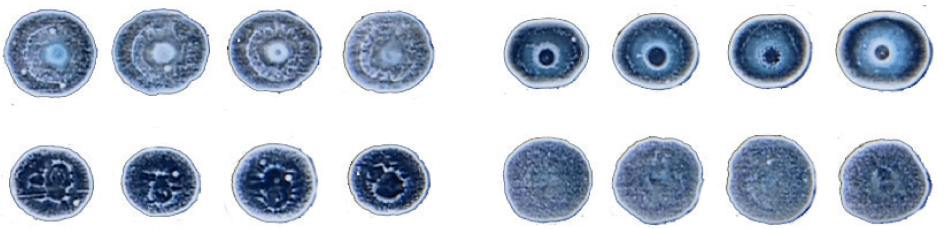
alone have enough observational ability to collapse a wave[250]. I wonder how this will apply to intelligent machines and AI. Will they be able to collapse things that we don't even know to exist?

With this in mind, it might be useful to think of awareness as a wave function, a sea of "possibilities", but consciousness as the "actual" instance of a collapsing wave of awareness. This would support the idea that everything that exists potentially has a consciousness, but weak "observations" will produce weak wave function collapses, a weak instantiation of consciousness. It would also suggest that the most "observation" that has ever occurred was at the moment of the Big Bang when everything was "observed" by everything in the 1 trillion-degree ball of super-plasma. Over time, observation decreases until no thing can "observe" anything else (that is, if the Universe continues only to expand). In this way, the Universe's ability to "observe" acts like entropy; the lower the entropy of the Universe, the more it could "observe". As entropy increases, the less it "observes" until it becomes completely "blind". If nothing is observed, nothing collapses. Like the tree that collapsed in the woods, if no one hears it, it is irrelevant whether it made any sound or not. Everything is just a wave function of potential when nothing can be observed. Perhaps the Zen-like fate of the Universe is not the Big Crunch, Big Freeze, or Big anything… it just becomes irrelevant wave functions of possibility.

Structured Memory

Another possibility as to where this information is stored is structure itself. It has been claimed that the structure of water can hold memory. Although this claim has not been sufficiently tested by any means, there is at least some evidence to suggest it might be valid. Dr. Emoto has been the most public in his claims that water holds memory and presents many examples and theories, but none of his work has been thoroughly tested by scientific standards. (*Note: I felt it was necessary to subject his tests to scientific study, but I have come to understand that such testing will guarantee unsuccessful results regardless of the validity of his experiments due to the nature of science as we currently understand it*).

There is quite a lot of information available about Emoto's work, so I will not repeat any of it here. However, Dr. Dean Radin, who has an impressive list of honors and a history of serious scientific work, did perform a "*Double-Blind Test of the Effects of Distant Intention on Water Crystal Formation*"[251] and reported very significant results (P=0.001). Dr. Radin has published a number of similar studies.



Speaking only for myself, one of the more compelling pieces of evidence I have seen comes from the experiment where 4 students created 4 drops of water, all from the same source. The image above shows the experiment results where a different student created each set of 4 drops.

This experiment was performed by Dr. Brend Kröplin and his team, which makes the results all the more valid, as Dr. Kröplin not only received his Ph.D. in the hard sciences (his thesis was on the elastoplastic stability of steel bridges), but he was also dean of the *Institute for Statics and Dynamics of Aerospace Structures* of the University of Stuttgart as well as the winner of the Körber European Science Prize, which resulted in a 1.5 million Deutschmark contract to produce high altitude (20km) communication equipment. This puts him very high on the "trusted sources" list.

Even if this is not bulletproof evidence (similar to the existence of Australia for anyone who has never been there), it is enough to raise the question. In addition, this test was also conducted using different types of flowers. According to the testers, the resulting patterns in the drops of water resembled the patterns of the flower. Tholonically, this is precisely what we expect to see, as energy patterns create the instance of the flower.

Another source that supports the idea of water holding information is Jacques Benveniste, a French immunologist who worked at the Institute of Health and Medical Research (INSERM) in 1988, who published a paper in *Nature* concluding that the configuration of molecules in water was biologically active even in the absence of the elements that caused that configuration. The homeopathic community immediately picked up this "water memory" as proof of its efficacy, even though it did not really apply to homeopathy.

While skeptics and institutional authorities can easily brush off Emoto's work due to its lack of rigorous analysis, Benveniste's work could not.

Nature magazine editor John Maddox (yes, the same person who promoted the burning of Sheldrake's book on the grounds of heresy, as well as claiming the Big Bang theory is "philosophically unacceptable" and that there was "no need to panic about AIDS"), prefaced the *Nature* article with an editorial comment entitled "When to believe the unbelievable", which admitted: "There is no objective explanation of these observations". That sounds like a begrudging admission, but it was more like a temporary retreat in preparation for the next offensive.

Nature did not want to publish the paper, holding its release for 2 years while awaiting independent confirmation from impartial laboratories in Israel, Italy, and Canada, who reported an observable biological effect.[252]

After the paper was published, there was an explosion of meltdowns from the scientific community. In response, *Nature* demanded that the experiment be repeated under conditions controlled by an ad-hoc selected team of its own, which included (and this should shed some light on their not-so-hidden intentions) the famous illusionist, pseudo-science enemy, and occasionally dishonest James Randi, plus Maddox himself and a malpractice investigator.

The *Nature* team did, in fact, find the same results as Benveniste, but with one fascinating exception: the effects of the tests disappeared when the laboratory members did not know if the water sample had been treated or not. One could claim the results were then biased based on this knowledge, but this would presume these hand-picked independent researchers were secretly fudging the data. If they were not, then the implication is that simply the awareness of the state of the water samples was enough to affect the test results. According to the tholonic model, being aware of something is sufficient to instantiate it to *some* degree, like a tholonic version of *observational powers*. In any case, this was sufficient for *Nature* to publish a report on this methodological flaw in Benveniste's experiments and officially called "water memory" pseudo-science[253], and published an article calling the entire idea "delusional"[254] (written by, of course, Maddox, Randi, and Walter W. Stewart, who has been "*been sharply condemned by other scientists who question [his] qualifications as self-appointed [guardian] of scientific integrity and who believe [he has damaged] reputations on the basis of flimsy evidence often self-righteously presented with an innuendo that suggests greater wrongdoing*."[255]). Case closed.

Or so they hoped, for not long after Benveniste's paper, The United Nations Educational, Scientific and Cultural Organization (UNESCO) decided to look into his work. In their words:

> *These data seem particularly important because they further enrich the immense achievements of molecular biology. They also suggest the development of new modes of transmission of genetic messages (transmission, transduction, teleportation, etc.).*

Fortunately, they did not invite Maddox or Randi to be a speaker. Instead, they invited the Nobel Prize-winning discoverer of HIV, Luc Montagnier, who, much to the skeptic's dismay, stunned many fellow scientists years earlier with claims that DNA emits weak electromagnetic waves that cause structural changes in water that persist even in extremely high dilutions… which is not exactly water-memory, but very close. As new evidence appears, Montagnier has gone on to say that "*More scientists are becoming convinced [of water-memory] by the data*".

OK, that was a long-winded bit of history there, but it shows the resistance to new ideas and the real possibility that water-memory exists.

But I am not a scientist, so I don't have to worry about what the editors at *Nature* or dubious debunkers think, so I can hypothesize the following: If the structure of water can hold memory, does this mean that the structure of other things can also hold memory? Can the thologram itself hold memory in its mega-meta-structure? If we claim that the structure of our material world is but an instance of that structure in the thologram, then we would have to say "yes", and that then opens the door to the idea that all structure, in every corner of the Universe, might be a memory store. Perhaps certain structures are better suited to hold certain types of memory. More exciting is the possibility that the mechanism to access this memory, and the knowledge it implies, is simply becoming aware of it. This last part is trickier than it sounds, as we don't know what we don't know, so how do we know what to become aware of?

Regardless of the theory, whatever it happens to be, the morphic or tholonic field would have to be something like an electromagnetic field in a different context, as the movement of energy causes both.

Key 78: Everything that exists due to the movement of energy has a field that originates in A&I. This field is the foundation of consciousness and knowledge.

The redundant and self-similar expressions of energy can be seen in the ever more complex and integrated patterns that have evolved since all of creation began as an infinitesimally small singularity of infinite gravity, zero time, and total mass that was the seed of this Universe.

By the same token, the redundant and self-similar expressions of awareness can be seen in the ever more complex and integrated patterns that have evolved since all creation began as a 0-dimensional dot whose only property was A&I.

The claim that energy itself is a fundamental form of A&I implies that everything that exists is also a form of A&I in the same way that everything that exists is a form of energy. To be aware of something is to direct energy to some concept or idea, thereby moving energy through that pattern and the Bell curve of that archetype, which alters the *norm* of what and how that archetype will instantiate itself.

From the tholonic perspective, if the claim is "energy alone can't be observed; only its interactions with other forms of energy (mass) can" is true, then it is also true that "awareness alone can't be observed; only its interactions with other forms of awareness can".

> *"Consciousness [ed: or awareness from the tholonic perspective] is part of our Universe, so any physical theory which makes no proper place for it falls fundamentally short of providing a genuine description of the world."* [256] ***~Roger Penrose***

Tholonic-fields exist in the realm of thought, ideas, and concepts, so any experiments that might be run probably need to be thought-based in nature. Is there any evidence that thoughts can directly alter our material reality? If the answer is yes, that might support the idea that altering archetypes in the realm of ideas has a measurable effect on the instance of those archetypes, i.e., reality as we know it. Chapter 11, "*Application of Awareness*", explores some of these experiments.

Reality

What about the possibility that reality itself, the world around us, matter, everything we consider to be real, *is* the memory?

This is very related to the information/dark-matter section above. This idea is based on Quantum Darwinism [257], which states that of all the probable states that can exist, the states that survive do so because of support from their environment. In turn, these states that survive transfer information to the environment, altering its context and shifting the curve in its favor, thereby improving the probabilities of future similar states.

As the energy interacts with the environment around it, the range of probabilities for the many attributes of an energy particle begins to decohere, or disappear, leaving only the attributes that are most compatible with the environment, which then interacts with the environment to make the environment more compatible with the attributes. Notice the compatibility of Quantum Darwinism with the descriptions of the social equations in the section "The Meaning of Math" in chapter 8, "*Instances*", and how quantum Darwinism is a perfect example of context→content →context→etc.

Reality, as we know it, is the consequence of this process of *decohering* the less successful possibilities of a particle's superposition. In the end, one set of attributes dominates, and that is what we see in the reality surrounding us. In other words, reality is the living record of what worked in the past and is currently working.

In the tholonic model, each tholon has a set of stable properties. Given its self-similar structure, each tholon only needs to manage the properties that relate to its scope or exist within its spectrum, leaving the parent properties to the parents and any of the child properties to the child. Each tholon then "knows" what works and expresses this in the instances of that tholon, which is every archetypal idea and form that can exist. When we look at a thing, like a rock, we are not just seeing the evolutionary results of the tholon of a rock but also the aggregated results of all related tholons; mountain, planet, solar system, galaxy, silica, molecules, atoms, electrons, etc.

The language of reality begins with one "letter" (a tholon) of the alphabet, which becomes 3 in the next generation, which becomes 12, etc. Each of these letters is a record of what "works."

Remember that phrase *combinatorial inflation* which describes the exponentially increasing number of possibilities in protein production? This is the big problem with current evolutionary thought, as there are simply too many combinations for nature to try.

Generation	1	2	3	4	5	…	147
Real Tholons	3	12	48	192	768		2.387152^{88}

In the tholonic model, these massively inflated possibilities are much simpler to navigate. We start with a duality within which a stable pattern emerges. From that stable pattern, a new duality emerges, which produces another stable pattern. For each generation, we have 3 new possible tholons from which patterns can emerge. Only stable patterns are capable of creating dualities, so unsustainable patterns never propagate. After a mere 129 generations of this process, we have produced 10^{77} possible tholonic paths or combinations, but at each generation, we only needed to create one pair of

parameters (we used 10^{77} as that was the possible number of protein combinations with just 20 amino acids and 150 proteins… a very, very small number when compared to the actual proteins that make up life).

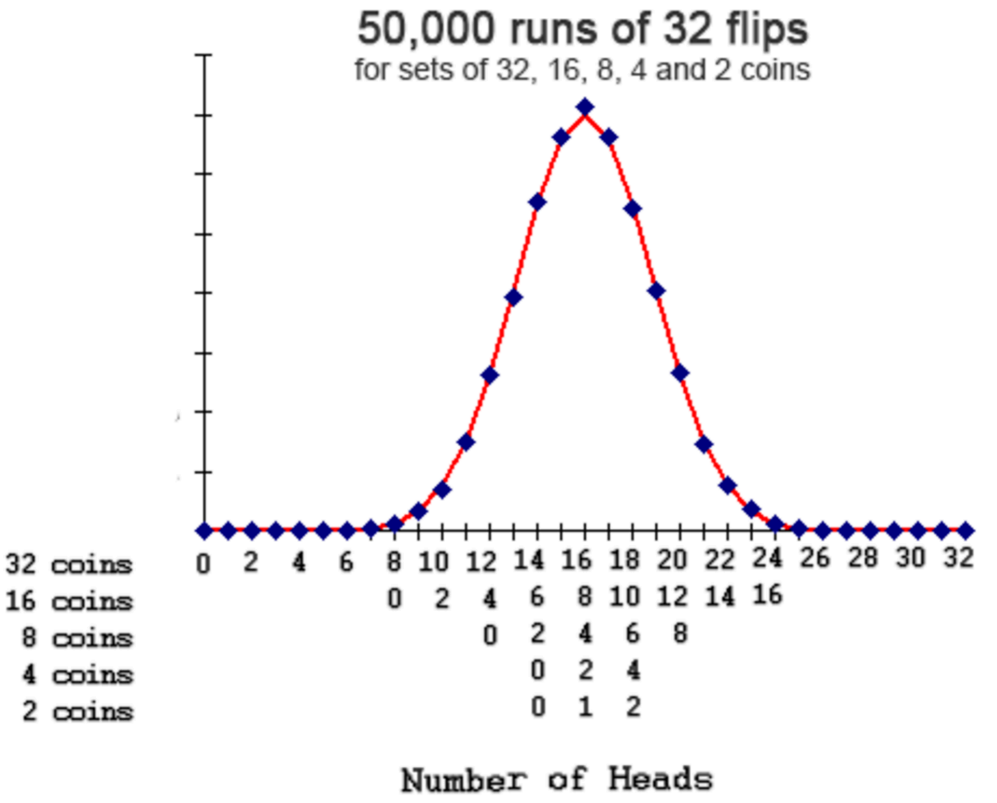
It is clear that the odds are stacked against a new form of a viable protein because the assumption is that the entire field of 10^{77} is available. Tholonically, the entire field available is limited to a mere 3 properties, but these properties are self-similarly embedded in every succeeding generation. If a new pattern emerged somewhere around the 63rd generation (10^{37} combinations), then an entirely new branch of creation would emerge at a point in the tree where it will have a significant presence at the 129th generation.

Here's a simple mathematical example.

First, let's look at the Bell curve again. Let's say you perform 32-coin flips 50,000 times and plot the results.

The peak of the Bell curve will tell us the most likely result, which is that we will get heads 16 out of 32 flips, on average. We have decided we will run this test 5 times, but each subsequent time we will only use the coins that came up heads in the previous test. We end up with the following:

- Test 1 with 32 coins, 16 came up heads
- Test 2 with 16 coins, 8 came up heads
- Test 3 with 8 coins, 4 came up heads
- Test 4 with 4 coins, 2 came up heads
- Test 5 with 2 coins, 1 came up heads



So, when we run these 5 tests 50,000 times each, the chances of us ending up with 1 coin from 32 coins is obviously 100%.

Now imagine we use different coins for each test;

- Test 1, 32 quarters
- Test 2, 16 nickels
- Test 3, 8 dimes
- Test 4, 4 half-dollars
- Test 5, 2 pennies.

We start with 62 coins (32 quarters, 16 nickels, 8 dimes, 4 half-dollars, and 2 pennies) but end up with 31 coins (16 quarters, 8 nickels, 4 dimes, 2 half-dollars, and 1 penny).

If an observer were blind to the process and only knew that the final result was one penny but that you started with 62 coins, they would say there is a 2:62, or 3.2% chance of you ending up with a penny, when, in fact, you know there is a 100% chance of you ending up with a penny. That's a 96.8% margin of error vs. a 0% margin of error.

The observer, in an attempt to replicate your success, but not knowing your process, will begin to run tests and keep notes on what worked and what didn't. He checks these notes every time he runs a new test to ensure he is not doing something that has been shown to fail. Once he discovers your process, he can archive the failed notes

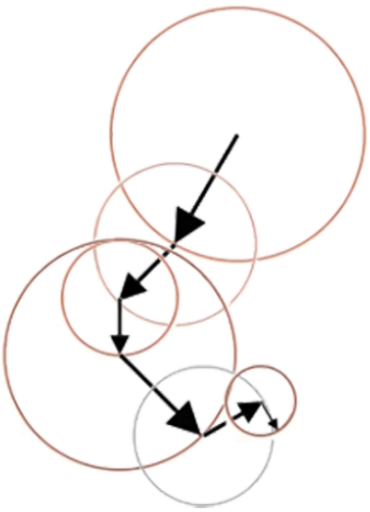
and describe the method that worked. He does not need to record all the failures once he has discovered the process that works, but he does so as to pass them on to the next generation of researchers who will approach similar problems in the same bottom-up fashion.

Existence does not need to record its failures as it is the ultimate top-down approach from the tholonic perspective. From the first instance of creation, nothing progressed unless the previous process worked, i.e., new child tholons are only created from the stable patterns of the parent tholon. No reverse engineering is necessary for existence as it is an exclusively forward-engineering process. If a branch of existence fails, it will only fail up to the last successful parent. This is like saying that if all your nickels were swapped out for double-tailed nickels, then all flips after the nickels would come up as zero, killing the entire branch below nickels and preventing any opportunity for the dimes, half-dollars, and pennies. The quarters are still fine, and because you want the tests to continue to work correctly, you need to get new nickels to fix the problem.

In our example, the flipping is analogous to the energy within a tholon creating stable patterns. The experimenter is analogous to the tholonic intelligence, which includes the intelligence that “fixes” the problem when feedback is received from the broken branch (i.e., bad nickels) that modified the curve (skewed results) which resulted in a new stable pattern (good nickels). (this example may sound ridiculously trivial, but it’s the simplest example I could think of.)

In this example of an experiment, or any experiment for that matter, from the tholonic view, both the experiment and the experimenter are an integral part of the tholonic expression. There is no data without the experimenter, the observer, and if there is no data then there is no instance, only an archetype.

A simple example more aligned to the tholonic model would be how N-states emerge along the Bell curves from which N-sources create new trigrams. This idea is shown in the image on the right using a Fourier Series of hierarchical circles. By assigning a value for points on the spectrum, and a binary value representing the generation of the trigram, we can create a unique value for every point that identifies its place on the spectrum and its level. If we combine these numbers, we can create one value for the entire lineage with an extractable record of the chain of tholons and their spectrum’s value at every level. This value would then act as a memory of all the ancestors. We can see this easily in simple binary math. If we have 5 generations of numbers that double with each generation, such as 1,2,4,8,16, and we have the number 22 representing the sum of all the contributing generations, we can easily determine that only the 2nd, 3rd and 5th generations contributed, because only 2, 4, and 16 can create 22. The tholons are similar in that each tholon has a fingerprint that is encoded in every one of its descendants that describes its path from the source.



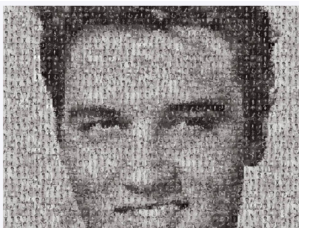
Path created with Fouries Series

This means that everything that exists is *already* a record of what works from the 1st moment of creation, through every generation, up to and including the thing that exists. Life, Reality, and Everything *is* the warehouse of all knowledge. We just haven't yet figured out how to decode (most of) it. We demonstrated an example of the binary qualities of tholonic counting earlier (the companion book "*The Tholonic I-Ching*" specifically addresses this and shows precisely how each tholon has a naturally existing binary signature). It may actually be that a thing itself ***is*** the value of that tholon.

We use numbers as data because numbers allows us to map a thing to the perfectly non-chaotic abstracted data-matrix which allows us to find patterns of order, but it's useful to remember that a *thing* is an ever changing instance of archetypes in a single moment of time.

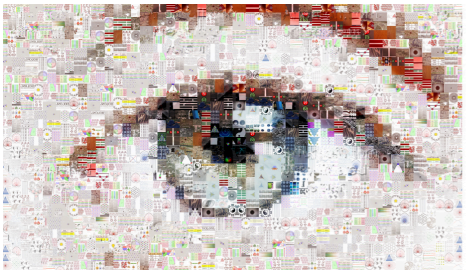
Hidden Data

This is similar in concept to the way a piece of music is the combination of many *atoms* of sound (yes, that's a real thing, and it's about 0.093 seconds[258]), each an aggregate of many individual frequencies. Over time, these frequencies change, resulting in "music" because we can "decode" those frequencies, thanks to the cooperative functions of our auditory cortex, cerebrum, cerebellum, and limbic system. We can also decode waves using concepts such as the Fourier Transform, which allows us to discover all of a wave's components, but that does not mean we can recognize what information is contained in that wave. For example, there can be images encoded in frequencies that no analysis will discover unless we know what to look for, such as the image of Barack Obama encoded into sound (Image right. For more examples, see *Appendix E*, "*Hidden Images*")



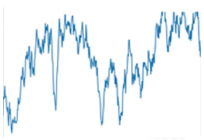
Another example of this that demonstrates some very tholonic concepts is a photo-mosaic, which is an image that is made up of other images, such as this image of Elvis that is made up of many images of Elvis. Now, imagine an image made up of many images, which are made up of many images, and so on, but instead of the patterns being that of an image, imagine the patterns as that of energy and awareness, with each image having its own intelligence and intention. While almost any collection of images can be used to create any other type of image, this is far less so when we speak of tholons, which are effectively living expressions of energy, intention, intelligence, and awareness. There are many more dimensions and constraints, such as the law of entropy, so some tholons will be more likely to form other tholons depending on the "benefits", such as conserving energy or enhancing adaptation, to both the defining and contributing tholons.

Just for fun, here is the human eye made only from images used in this book and a bull skull in Death Valley made with blooming flowers.

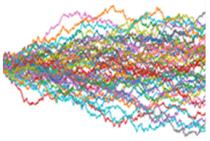


Brownian Archetypes

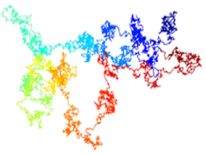
These images are meant to demonstrate how information can be composed of information and how any one piece of information is composed of smaller pieces and part of a larger piece. So, how can we even begin to decode such information? One thing we can do is look at how information "progresses". The multiple generations of embedded images, or tholons, or fractal patterns, represent unique paths, or lineages, that start from one point but end up at many points. The progression of these lineages is not predictable but is not random. They are the result of expanding energy moving forward in time, diverging from one archetype and converging toward others, not unlike the Brownian movement (examples shown below).



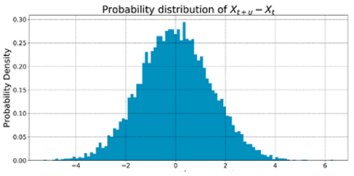
Stock Market



Amoebas



Floating pollen



This claim is based on the fact that Brownian and Fractional Brownian Motion (FBM) is an archetype for, and can describe, rivers [259, 260], trees [261], neurology [262], landscapes, and appears to be fundamental to all organic growth.

In all cases, the paths of growth will be determined by the basic rules:

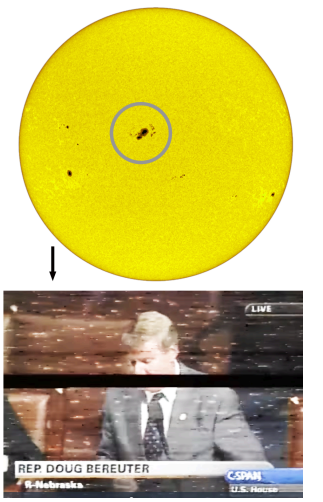
- All movement will always seek the path of least resistance.
- Paths of least resistance will form patterns.
- Patterns form archetypes.
- Energy (movement) is always diverging (and converging?) *from* one archetype *towards* another archetype.
- All movement is an expression of energy seeking balance.

There is much more to the significance of Brownian mechanics, at least from the tholonic view, but this reasoning is well outside the acceptable limits of scientific thinking. The reader can decide whether the following it is worthy of consideration.

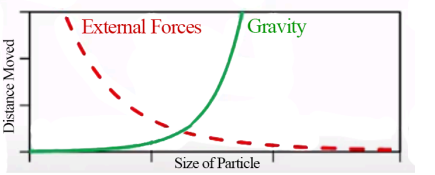
External forces cause the “jitters” in Brownian motion. For physical things, like amoebas and pollen, this can be collisions with other particles. For something like information, this can be “noise”, such as the small transactions of buying and selling when looking at the stock market as a whole. In general, the larger the object, the less effect these smaller influences have. A falling spec of dust will have Brownian movement, but a falling rock will not. A huge move in the market will be unaffected by small transactions. This same concept applies to energy fields, such as electricity or radio waves. We see examples of external forces affecting these fields in electro-magnetic interference of solar flares, auroras, or ignition systems.

This last reference will be obscure to the under-50 readers. Once upon a time, I lived in a small rural New England town. If I had the radio on in the house and a car drove by with a poorly insulated ignition system (very common in the 60s), I could hear the ignition system sending pulses to the spark plugs as clicks over the radio. Without seeing the car, I could tell if they were going too fast for 2rd gear or too slow for 3rd (automatic transmissions were rare in that time and place), thereby discovering that Mrs. Brown, the 2nd grade school teacher, was a far better driver than the Police Chief, who also owned the slaughterhouse. This “inside information” was due to field interference. Were I a mechanic, I could have used this data to make some pre-digital, data-mined, targeted sales. Today, we can hear a distant person’s voice through the interference of light and sound waves bouncing off a nearby box of tissues. In the same manner, we can learn things about the Sun based on how solar flares disturb television transmissions

If someone was aware of how fields interfere with each other, and they happened to be watching the TV transmission on October 8, 2002, which was disturbed by a solar flare 93,000,000 miles from Earth, the fuzzy dots on the screen would be telling them to bring in the tomatoes, stock up on firewood, and make sure all the flashlights in the house worked because they would also know that this field disruption can also disturb other types of fields which could result in electrical outages, crazy weather, and even earthquakes. This same reasoning applies to the thologram, as the first and largest tholon unaffected by external forces. At the same time, the tholons on the edge of creation, that *boundary layer* between order and chaos, where *somethingness* expands into *nothingness*, are bombarded by the external forces of the countless surrounding tholonic fields.



The difference between particles and data, instances and archetypes, is that particle movement is also affected by gravity. The smaller the particle, the more effect external forces have, and the less effect



gravity has (due to air resistance). The dominance of external forces vs. gravity is well known. *Note: Gravity is a real force, but not in the traditional sense of direct, classical, action-at-a-distance force between two objects.*

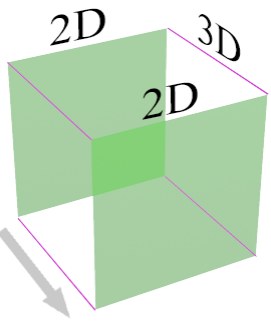
How does gravity relate to tholons? If we momentarily accept the hypothesis previously mentioned that gravity is an instance of awareness (consciousness), then can we speculate that in the non-physical realm of tholons, concepts, ideas, etc., we would see a similar pattern but replacing gravity with awareness or consciousness? What would this tell us? We would first notice that the 1st tholon would be all-encompassing and instantiate as pure awareness, defining the limits of all it contains. All measurements are relative to these initial limits, for example, *c*, the speed of light. As the first tholon is in a void of nothingness, it cannot be measured relative to anything else.

The parallel might also suggest that “large” and stable concepts, such as religious, political, economic, or ideological concepts, have a conceptual “gravitational” force, which pulls other smaller concepts into their “orbit” and perhaps absorbing them completely. And, as the singularity of the 0-dimensional dot represents the singularity of the Big Bang, which was infinite gravity, that 0-dimensional dot of A&I is like the “black hole” of concepts, ultimately absorbing all. This would explain why otherwise rational and intelligent people can advocate for dysfunctional, inaccurate, and even destructive concepts. This seemingly self-destructive behavior is tholonically compatible because, from the tholonic view, the only thing that matters is if a concept can survive. The more awareness applied to a concept, the more “gravity” it has, conceptually speaking.

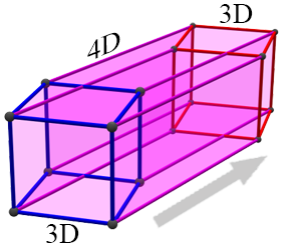
Relative Archetypes and Time

This is somewhat similar to Relativity Theory, but we will not get into the details of Special Relativity, General Relativity, Lorentz Transformations, and all the other stuff that such topics inevitably lead. Instead, we will state the following: The speed of light is symbolized as *c*, which means that *c* is also the *speed of causality* or the *speed of cause and effect*.; it is the maximum speed at which any separate parts of the Universe can interact. If seemingly separate things appear to interact faster than *c*, then, in reality, they are not separate things, even if they appear separate in 3D reality.

How is this possible? Imagine we have a single point that is 0-dimensional. If we extend that point to a line, we have added 1 dimension and now have 2 points. If we extend the line to a square, we have 2 dimensions, 4 points, and 4 lines. Extending the square to a cube gives us 3 dimensions, 8 points, 6 squares, and 12 lines.

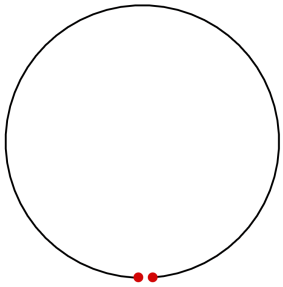


However, in a 2D world, we can't see the 3rd dimension, so all the squares that exist in the 3rd dimension are invisible to 2D observers (image right top)[263].



Now, if we extend a cube into the 4th dimension, we end up with 8 cubes, but 6 of those cubes require the 4th dimension to exist, leaving 2 cubes that can be expressed in 3 dimensions (right image bottom). Therefore, in the 3D world, a 4D cube would appear as 2 separate 3D cubes. Tweak the 4D cube, and both 3D cubes will change simultaneously. Tweak either of the 3D cubes, and you are effectively tweaking the 4D cube, which will simultaneously tweak the other 3D cube.

It will appear as though there is faster-than-light communication based on the distances between the 3D cubes, but the actual distance that matters is the distance in the 4D world, as that is where the interactions occur, where the cause and effect are taking place. We can see in the image (right) that a pair of 1D points can be very far apart in 1D space while being very close in 2D space.



In the tholonic model, it appears as though 3D contexts are recursively embedded within 3D contexts. More accurately, they would be 4D contexts if we consider time as the 4th dimension. If that is the case, then this 4D world is embedded in a parent 4D world, making this world more of an 4*n*-dimensional reality where *n* is the number of embeds between the primal context and our current context. Of course, we can ignore all but the more obvious dimensions as they don't have any commonly perceivable effect on our reality, but maybe we can find them in the laboratories.

I doubt such a test has ever been run, but it would be interesting to know if the "spooky action at a distance" that we see with quantum entanglement is instantaneous or just faster than the speed of light, perhaps by many times or maybe a quantum physicist can explain why that is a silly question even to ask. Were *c* infinite, as was once believed, cause and effect would happen instantly, and all of existence would be an infinitely short and busy blip and then over.

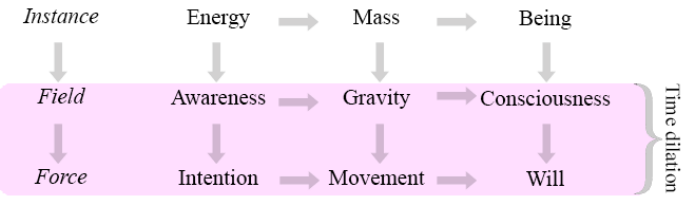
Relativity tells us that time is not absolute and needs to change or *dilate*to accommodate the speed of light relative to your speed.

For instance, imagine you and your friend are on Earth. Each of you has a laser that you both turn on simultaneously. As expected, the beams will travel together at the same speed. Now, imagine you are standing on Earth, and your friend is about to pass Earth at 99.999999% the speed of light. When the both of you are side by side, you both turn on your lasers. The beams of light will STILL be traveling at the same speed together. How is that possible? Your beam is traveling at the speed of light, but your friend's beams must only be traveling at 0.0000001% the speed of light. In fact, both beams travel at the same speed, but *time* for your friend is ticking much slower than *time* for you. The time is takes for his laser light to travel 1 light-second will take 6 hours and 12 minutes in your Earth time, but only 1 second for him as his time is very *dilated*, or slowed down relative to your time. In this way, the light is still traveling at 300,000,000 meters/sec for both you and your friend. What was just said about the speed of light also applies to the speed of causality.

Why are we talking about this in a chapter on fields? Because the field of gravity affects time and space. The more gravity, the slower the time. So, time goes slower when you are moving fast, or you are near gravity?

It is more useful to think of gravity and speed as two sides to the same coin that slows time. This makes more sense if we replace the concept of speed with that of *quantity of movement*, or just *movement*. The field of gravity causes movement due to gravitational force; the more mass, the more gravity, and mass is energy.

It's been suggested that gravity and consciousness are instances of awareness in different contexts. As instances, they both have manifest expressions, but as properties, meaning they are properties of existing instances of matter. All matter has some gravity, and all matter has some consciousness, at least from the tholonic perspective. As awareness cannot exist without intentions, how is intention expressed? In the context of matter, intention is movement. In the context of consciousness, intention is *will*, and energy is... Being? Spirit? Sanmātra ("mere existence")? We don't have a word for the energy that forms consciousness, mainly because we hold the concept that consciousness is a by-product of neurology. We'll use the word "being" for now.



This is a wild claim, but it holds up. Not only is there actual scientific research on related topics such as temporal consciousness[264], gravity and consciousness[265], intention and consciousness[266, 267, 268], intentions and physics[269], but we can easily test this ourselves. All you need to do is spend 5 minutes eating your favorite ice cream, and 5 minutes watching a pot of water come to a boil. Which took longer?

Of course, many might rebuff that last claim with, “That’s not the same. Time didn’t *really* slowing time. 5 minutes is still 5 minutes”. The proof, the *only* proof, that supports this seemingly valid argument is the clock on the wall. But is that proof and is that argument true?

Why did it take 6 hours and 28 min to watch your friend’s laser light move 1 light-second? When we say “5 minutes is 5 minutes,” we assume there is no time dilation difference between any set of 5 minutes, but there is time dilation in our perception, our consciousness of those 5 minutes, which we can’t disregard considering were it not for our consciousness we wouldn’t be looking at anything. Our perception of time doesn’t change the clock’s mechanics on the wall any more than looking at a tree will alter how your televisions works. Still, the clock on the wall is measuring a particular form objective time in an extremely limited context.

It’s been proven many times over that past 100 years that time is relative, so there is no objective standard for time. We use atoms to get precise timings for clocks, but even these atoms don’t agree with each other unless they are at the same altitude and in the same location. An atomic clock in Peru ticks slower than an atomic clock in the Arctic because there is more gravity in Peru. So, we put an atom clock in Boulder, Colorado, and say, “This is the official time”, and then go to great lengths to make all the clocks agree with that, otherwise satellites, communications, and navigation would be a complete mess. This is why satellite’s time keeping has to be updated every 12.5 minutes. Anything that needs to be adjusted 42,048 times a year to work properly can hardly be called an objective standard of measure or accuracy. And even with this atomic clock in Boulder, the time dilation in the Universe is constantly changing due to the Universal expansion, so 5 minutes today is not the same as 5 minutes tomorrow, even though it *appears* the same to us because we are also changing with the expansion.

Clock-time has very little to do with actual *time*, as in the *time* element of space-time. We invented the illusion of an objective, stable time, then built our culture, science, technology, and, most importantly, our worldview around it. Thankfully, it is not going away any time soon, as it definitely has utility, but that does not mean what we call time is actually *time*.

Part III

12: APPLICATION OF AWARENESS

Instances of Awareness and Intention

Synopsis: *The intelligence and intention of archetypes and instances. Myths and deities as instances of tholonic archetypes. Coherent awareness and intention. The entropy of thought and entropy-debt. Structure as coherence. Qualitative energy. The influence of language in metaphysics, beliefs, and consciousness. The living archetype and its instance within Jungian 'ordering factors', mystical tradition, and modern society.*

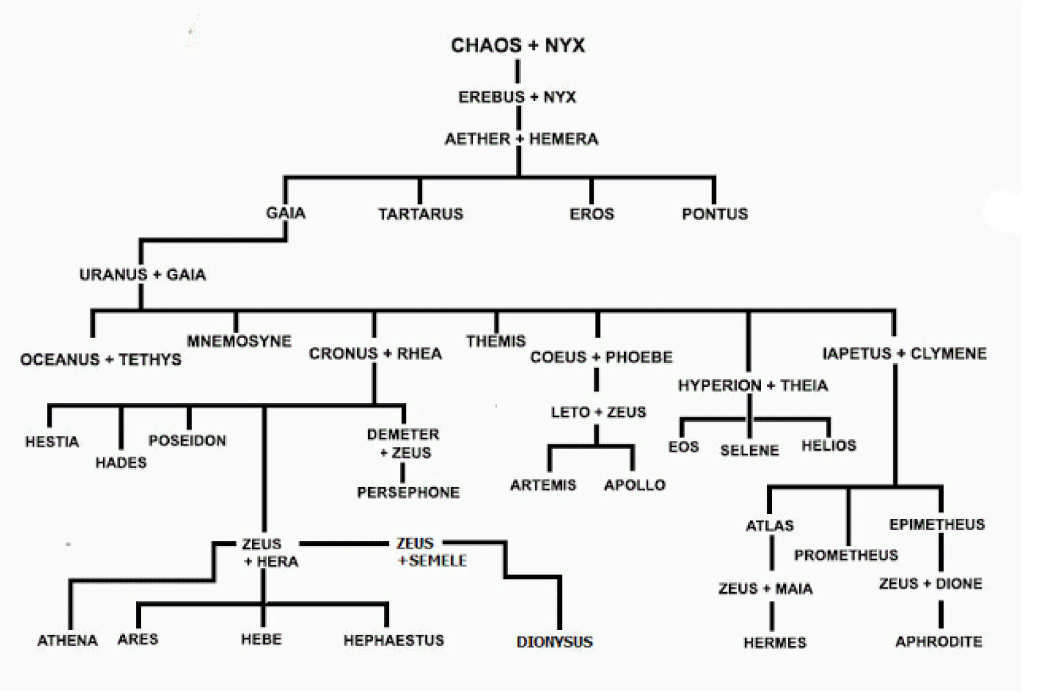
Keywords: *mythology, archetypes, coherence, prayer, meditation, thought, entropy-debt , structure, water, language, names of god, tulpas, golems, archetypes*

It may seem odd that *mythology* would be placed in the chapter on how awareness is/can be applied in the real world, but beliefs of any sort are excellent examples of the application of awareness. Beliefs are perhaps the most common way to channel awareness as they can cohere the otherwise undirected and unrestrained awareness. In this way, beliefs act like the point of *Definition* in the tholonic trinity, restricting how that awareness is expressed. Considering this, it is no wonder that mythologies so closely reflected the archetypes of creation. From the tholonic view, it was/is the intelligence of these archetypes that vie for that awareness within the arena of human consciousness. Mythologies and beliefs are the earliest forms of Man's *conscious will* to have a hand in creating his reality.

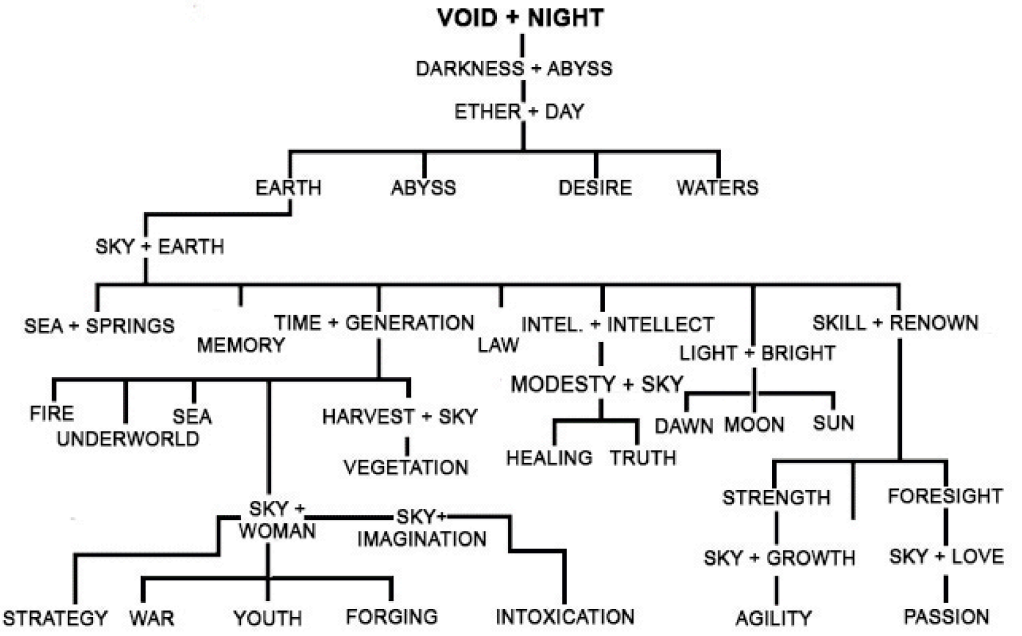
It may sound childish or even superstitious to suggest that archetypes can have intentions that can result in conflicting and/or cooperative relationships, which implies allies and enemies and, therefore, some sort of diplomacy and politics. In one sense, it is childish in that it leaves so much open to the imagination. In another sense, it is childish because beliefs are an early form of learning how to use the power of awareness. Beliefs are the Legos of awareness. Beliefs are also placeholders that fill in the blanks of our limited understanding of the mechanics of awareness, intention, and intelligence, which is also why they significantly affect our understanding of reality.

The ancient myths provided a pretty effective way to understand the workings of reality, given the context and scope of our abilities when they were created. We see these gods and their unending dramas as anthropomorphized concepts of tholonic intelligences and their interactions. As previously stated, tholonic archetypes, like the gods, are autonomous agents in a self-reproducing system. To get a general idea of the soap-opera-of-psychopaths-on-steroids that was the life of the Gods, see *Appendix D*, "*Greek Gods*" It is short and quite entertaining.

These two charts compare the hierarchy of the Greek Gods (according to Gaius Julius Hyginus, a scholar born in 64 B.C.) and the same hierarchy composed of one (of many) archetypes represented by that deity.



Greek Gods according to Hyginus



Archetypes of Greek Gods

It’s insightful to see how everything starts in the nothingness of the void, descends through the noble qualities of intellect, skill, healing, and imagination, and ultimately settles down to youth, sex, booze, food, and war. Clearly, the Ancient Greeks were on to something.

Note: See “Tholonic Intelligence as Gods” in Appendix L, “The Thologram and Religion” to see a comparison of Greek goods and Levantite god of the Israelites and Canaanites.

Sensing Intention

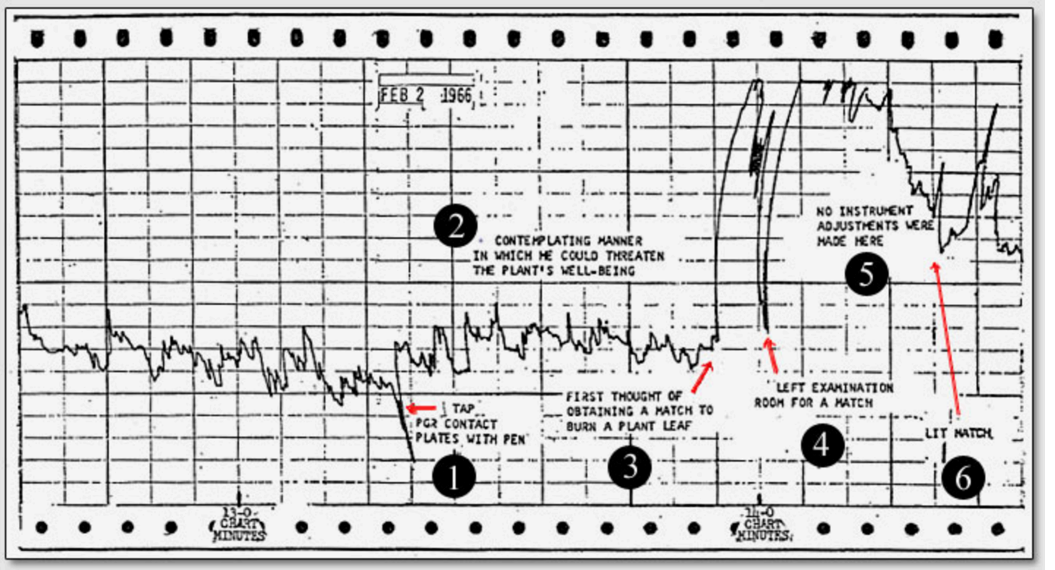
The idea that plants, and presumably other life forms, are sensitive to the feelings and intentions of others within their sphere of influence is not new. An early (1960s) instance of this idea is called the *Backster Effect*[270], named after Grover Cleveland Backster Jr., who was not only an interrogation specialist for the Central Intelligence Agency (CIA) but went on to become Chairman of the *Research and Instrument Committee of the Academy for Scientific Interrogation*. From his “interrogations” of plants, he concluded that plants not only feel pain but emotions and even have ESP abilities.

There still exists debate about the validity of his claims and the claims made in the popular 1973 book “*The Secret Life of Plants*”, but at the very least, there is sufficient evidence to justify more investigation. The tholonic view is that everything that exists is part of a *Vast Active Living Intelligence System* (to borrow the title of a book by author Phillip K. Dick) that we call the Thologram. Consequently, everything *must* be connected to everything else in some way and form. As our knowledge and ability to share that knowledge expands, our understanding of reality will also expand in many different directions. Multiple theories, philosophies, and practices will not only emerge, but each will have its own body of evidence supporting that model. Some will flourish, and others will wither away. This is the evolution of perspective.

Similar to the “Can you prove Australia exists?” problem, at some point, we need to choose what or who to *believe* is true or not. While the Backster Effect is soundly grounded in tholonic principles, that alone is not enough to accept it as real. Perhaps the most convincing support comes from one of the more ingenious scientists of the 20th century, Marcel Vogel.

Marcel Vogel (1917 - 1991) was a research scientist for IBM’s San Jose facility for 27 years and was granted several patents, from hard-disk magnetic coatings to egg testing. At age 6, he was pronounced dead from double lobar pneumonia. He claimed that while he was “dead”, he experienced a light, a sense of love, and overwhelming well-being, which formed the underlying fabric of his life and beliefs.

With the aid of IBM’s state-of-the-art equipment, he replicated the Backster Effect. Below is the polygraph results that he said made him a “believer”.



Vogel even lectured at IBM on the subject of “Do Plants Have Emotions?” which, in 1969, was a radical concept. He experimented with plants for some time and discovered several odd and “unscientific” facts. For example;

- It was observed that when he released his breath slowly, there was virtually no response from the plant, but when he pulsed his breath through the nostrils, as he held a thought in mind, the plant would respond dramatically.
- The plant’s response was the same regardless of distance, as the results were the same when he was in San Jose (where his lab and the plant were) or in Prague, Czechoslovakia. This also suggests that coherent thought acts similarly to coherent energy in that it can travel long distances without losing power.
- Plants appeared to respond more to the threat of damage than the actual damage itself.
- Plants appeared to have many of the same properties as batteries, especially regarding their interactions with thoughts.
- It was observed that the experimenter’s attitude, or mindset, had a measurable effect on the test results. This might shed some light on the inconsistent results of the “water memory” experiments of Jacques Benveniste, as related previously.
- He concluded from these experiments that he “learned that there is energy connected with thought. Thought can be pulsed, and the energy connected becomes coherent and has a laser-like power.”

Because of his young near-death experience, Marcel believed that the greatest cohering agent is love. This may be correct. The tholonic view is that *intention* is the basis of reality and creation but says nothing about what that intention *is*. The tholonic position is that *any* intention is equally valid. However, it’s reasonable to imagine that some intentions are more effective than others, and it is reasonable that the intention of love may be the most sustainable.

Such ideas did not endear him to the scientific community. Still, this discovery opened many new doors of investigation for Marcel, especially in the areas of crystals and water, with some very impressive (anecdotal) results. This set him apart from his fellow scientists and ensured his obscurity.

Maharishi Effect

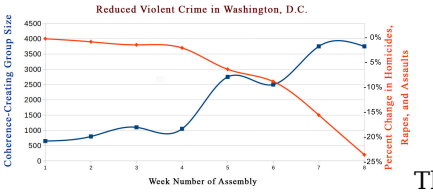
Given the general direction of mainstream science, we do not see a lot of investigation into how thought affects external reality. However, some research does exist *(see items 3 and 4 in "Other Experiments" list below)*. We will look at one research report here, *"Effects of Group Practice of the Transcendental Meditation Program on Preventing Violent Crime in Washington, D. C.: Results of the National Demonstration Project, June-July 1993"* [271] published in the journal *"Social Indicators Research."*

This study and its 4,000 participants, monitored by a 27-member project review board comprised of independent scientists and Leading citizens, found a significant statistical result.

What was this study exactly?

> *This study presents the final results of a two-month prospective experiment to reduce violent crime in Washington, DC. Based on previous research, it was hypothesized that the level of violent crime in the District of Columbia would drop significantly with the creation of a large group of participants in the Transcendental Meditation® and TM-Siddhi® programs to increase coherence and reduce stress in the District.* [272]

Here, the word "coherence" refers to its definition of "*the quality of forming a unified whole*."



The results were impressive.

This is only one study, so it is not definitive. It is certainly supportive of the idea that directed intention, what the participants called *coherence*, and what we are calling *order* (as that is what unifies the parts into the whole) has an extended effect. According to the tholonic model, the directed energy of coherent thought alters the curves of various archetypes, thereby altering the probability of where the "work" will produce the most order or where and how energy will be expressed across a scope's spectrum.

On a Personal Note

I had a particularly insightful experience with the Maharishi Effect in the late ’60s when I was a young teenager. My father was a captain of industry in the world of electrical components, ultimately becoming president of one of the pioneering companies that helped create the integrated circuit.

Born of poor Scottish immigrants in the Bronx on the tail of the Great Depression and serving in Korea, he was no stranger to hard times and hard work, which made him one of the most pragmatic and practical people I have ever known. He was a devout capitalist, atheist, and husband and had no patience for anything that did not produce results. Hippies were idiots, imports were ruining the economy, Scotch whiskey was better, and talking about your problems was for whiners. You get the picture.

At the insistence of his wife (and my mother), he joined her for a seminar on *Creative Intelligence (CI)*, which they called Transcendental Meditation back then for those folks like my father. He heard their claims about improved mental and physical health, better focus, fewer distractions, etc. He decided to test their claims by giving all his employees in one of his factories CI training, along with an extra half-hour lunch break for them to take this training and practice their new CI skills.

This factory was in a poor, rundown industrial town in New England. The people who worked in those factories were uneducated, unskilled, assembly-line laborers - not exactly an open-minded demographic. I knew many of them myself, as we lived in that town, and many never made it past 4th grade. The rivers in this town were dead from all the pollution, and the neighboring town had the highest *per capita* suicide rate in the United States. It was a dreary, dark place filled with dreary, dark people.

My father’s industry peers thought he was foolish to deploy such a plan, but the results were astounding. People were fighting less and taking fewer sick leaves, injuries were down, and production went up; everything improved. So much so that the Wall Street Journal did an article on him and his “revolutionary” new technique. He became known as some kind of New Age Industrialist, which was ironically funny as he was as new age as his ’57 Chevy.

Ultimately, this new concept was unsustainable in that environment because eventually, people began to abuse the extra time meant for CI, and everything went back to *normal* with sick leaves, fighting, injuries, and lower production, so the program was scrapped.

Prayer

You might think that traditional prayer holds the same power, but the evidence might suggest otherwise. Why? Because most prayer is anything but coherent. Prayer varies depending on culture, religion, personal perspectives, etc. Perhaps this is a side-effect of monotheism, which eliminated the myriad of niche gods. In any case, prayer can be anything from begging to demanding, justifying to virtue signaling, and occasionally

it can be an expression of gratitude and love, but using group prayer to effect change is like using a group of blind people to paint a room by throwing handfuls of paint at the wall. Your room *will* get painted, but you'll wish it didn't.

This was recently confirmed by a $2.3-million-dollar study on the effect of prayer on the sick, involving over 1,800 patients. It was the largest study of its kind ever undertaken. Contrary to prayer helping the sick, they found that when a patient knew others were praying for them, they tended to have *more* complications. [273]

Other studies conclude the exact opposite, such as Dr. Byrd's study "*Positive Therapeutic Effects of Intercessory Prayer in a Coronary Care Unit Population*" [274] and Dr. Harris's study "*A Randomized, Controlled Trial of the Effects of Remote, Intercessory Prayer on Outcomes in Patients Admitted to the Coronary Care Unit*" [275]. However, without a detailed comparison of the studies and specifically how the participants prayed, we cannot know to what degree coherence was at play.

The difference between the coherence of Transcendental Meditation and prayer is the former follows a particular set of rules, has a beginning, a middle, and an end, has a clearly defined non-personal target subject, and never attempts to force change. Prayer can follow these same rules, but it rarely does.

The practice of *coherent prayer* is common among secret metaphysical societies. For example, in the not-so-secret secret society of the *Order of the Rosy Cross*, or *Rosicrucians*, members who have reached a certain level of initiation are introduced to a schedule of "prayers". This is a globally synchronized schedule of times when people are requested to focus their energy on a particular topic, such as health or family, or finances, in a specific manner. If one is not in need, one sends their gratitude into a "pool" of energy specific to that topic. If one has a need in these areas, they can join at scheduled times and "tap into" that pool. This is a very coherent technique because it has specific archetypes and directed energy, which then creates sustainable patterns, and it (reportedly) works surprisingly well.

As coherence is a property of a field, we can say that coherent thought is a property of the *Consciousness Field*, as it is referred to by Roger Nelson of Princeton University and director of *The Global Consciousness Project*, and which is not limited to humans but can affect matter and machines also *(see 2 top items listed below under "Other Experiments").*

Thought

Suppose we look at meditation, prayer, and other forms of coherent thought. In that case, we have to also look at the concept of entropy because coherence is *lower* in entropy than incoherence, just as laser light is lower in entropy than normal diffuse light. This suggests that the act of meditation, prayer, concentration, focus, and even attention in general, creates a lower entropy state from a higher entropy state, which is contrary to the direction of entropy, at least according to the 2nd law of

Thermodynamics. While the 2nd law is not really a law but a statistical probability, the probability of breaking that law is extremely unlikely, so how can coherence of thought be possible?

Another point regarding entropy

- It needs to be pointed out that *entropy* is a property, a measure of the *total energy* in a system; the more *total energy*, the lower the *entropy*. This *total energy* is technically called *enthalpy*. However, we use the term *entropy* to represent the measure of *total energy* and the energy itself, or *enthalpy*. This is the same as how we refer to physical material as *mass* rather than *matter*, as *matter* is the actual material, but *mass* is the measure of that *matter*. A kilogram is *mass*, a kilogram of potatoes is *matter*. They are the same thing, but referenced differently, that is, until we get into the bizarre outliers of quantum and relativistic phenomena where *massless matter* exists, but as we don't normally exist in wormholes, we will conveniently ignore this exception. *Massless matter* is not to be confused with *massless particles*, such as photons. The concept of a *massless particle* was born when Einstein proclaimed, "light consists of spatially random particles", which was a poor choice of words, but that was in 1905, so he didn't have a lot of options given the scientific vocabulary of the day. We all know that mass means matter, and the point of this book is to try and communicate ideas to the readers, not to confuse them. Additionally, because we are using the concept of *entropy* outside of its strictly thermodynamic context, the concept of *enthalpy* becomes even more confusing. A compressed JPG or ZIP file image has high *entropy*, so does that means it has less *enthalpy*? What does that even mean in the context of JPG images and ZIP files? An uncompressed file has more *total energy* than a zipped file? Perhaps, but we won't be going near such concepts. *Applying* enthalpy to consciousness would get even more obtuse and confusing, especially as we have no idea of the "energy of consciousness" and certainly no idea how to measure it.

From a thermodynamic perspective, focus, concentration, prayer, etc., only uses 5% of the calories needed to power the brain, or 0.65 calories an hour, no matter how hard you concentrate. This means a single chocolate chip cookie could power a year's worth of meditation or focused attention if someone meditated for 20 minutes daily. Yet, focused thinking accounts for almost everything humanity has created since he thought, "hmm… I wonder if farming is easier than hunting and gathering?" and started the *Neolithic Revolution* that changed humanity forever. It was not the 0.65 cal/hr our hunter/gatherer ancestors spent coming up with that idea of farming that challenged the 2nd law, it was the implementations of the idea which created more ordered, lower entropy, systems of food procurement.

Similarly, if one happened to have a brilliant idea during deep thought or meditation, we certainly would not say the was was 2.7214 watts (which is 0.65 calories) worth of brilliance.

This brings us back to the question, "How can a system become more organized in an ever-increasingly chaotic system?". This argument is called the *Schrödinger paradox*, as it was introduced to the world by Erwin Schrödinger in 1933 in his book "What is Life?". But Schrödinger had the answer (it's not clear why it is called a paradox

considering the question is rhetorical, making it more of a *Schrödinger's rhetoric*). We briefly touched on this earlier, but here is a paraphrased version of Schrödinger's explanation:

The 2nd law only applies to *closed* systems, where no energy can enter or leave. Life, at least on Earth, is an *open* system, as we get lots of energy from the Sun, and our solar system is an open system as it gets energy from the galaxy. In practical terms, the Universe as a whole is the only closed system (that we know of) in nature. So, the evolution and self-organizing of life *appears* to break the 2nd law, but it doesn't *really* because it's getting more energy from the Sun than it expends evolving and self-organizing. This is called *free-energy* or *negentropy* (negative entropy), a term coined by Schrödinger in the same book. The reason he coined the word rather than just saying "negative entropy" is because he did not feel that simply adding a "-" in front of "entropy" captured the remarkable ability of living systems to seemingly violate the 2nd law by lowering their entropy and increasing organization, order, and structure.[276]

This tells us that a system can self-organize as long as the reduction of local entropy is less than the free-energy it receives. Why *would* any system self-organize to begin with? Because whatever anything is organizing into, it does so only because it is a more efficient structure for the distribution and preservation of energy, as we saw back in *Chapter 4* where Jeremy England of M.I.T. explained how hydrocarbon-based blobs can turn into a life form.

Schrödinger was speaking about things like evolution and solar/cosmic energy, but thermodynamically speaking, we have more than enough extra energy just from the calories we consume to "power" coherent thought. So, if we have the energy, and coherent thought is so easy to produce, why don't we not all have super-coherent consciousness?

I am sure there are many reasons, but a particular reason has to do with our neurology, which is not only still evolving, but whose primary task is *not* to develop or enhance consciousness but to "*encode and integrate information acquired from the environment through sensory inputs, and then generate adaptive behavioral responses*"[277]. What is traditionally called consciousness is more of neurologically based meta-awareness resulting from our brain's *frontoparietal network's*[278] ability to recognize relationships. Within this network is the crowning achievement of evolution[279], the *cerebral neocortex*, which, due to its increasing complexity, formed interneuronal networks within networks until one day it was able to process the relationship between "I" and "Not I", and voilà, "I Am" became a thing. While our new and improved brain allows us to apply conscious intention to direct our brain to focus at will, it's not going to do it all by itself. There needs to be the intention to focus, to cohere.

Another reason we are not all super intelligent, highly evolved Nietzchean *übermenschen* is because of our materialistic view of consciousness that severely limits our understanding. i.e., that consciousness emerges from the brain. Unfortunately, modern mainstream science does not accept the idea of consciousness as an instance of A&I or that the energy that is being balanced and distributed by consciousness if

an expression of A&I that operates in a different scope and context. As science has no tools to detect it or measure it, it doesn't exist because accepting the accepted scientific axiom that that…

> *Regardless of whether something exists or not, something is real when it is a necessary ingredient of a theory that correctly describes what we observe.*

… are we also also accepting the following premised as valid by default?

> *Regardless of whether something exists or not, something is not real if it doesn't conform to existing theories.*

In the tholonic view, this other form of energy that is balanced and dispersed via consciousness would conform to the laws of energy as they apply to this different context. We would expect there to be some form of entropy, in which case we could apply Schrödinger's reasoning and suggest that consciousness is an open system receiving free-energy from the Source A&I.

This is not that radical of an idea, as it is similar to how we understand that matter is a very slowed-down or rudimentary instance of the energy we call E, as in $E=mc^2$. Here it is being suggested that energy (E), is a limited instance of an even finer form of energy that instantiates as consciousness and, while non-physical in nature, is influenced, limited, and reformed by the context of its expression. i.e., a flower, a person, a planet, etc.

Entropy-debt

Another related idea is a highly speculative concept related to the above, which is the idea of *entropy-debt*. This is similar to Schrödinger's concept of *negentropy*, but *entropy-debt* is more of a tholonic view that also addresses the issues of consciousness and time.

Farming is a particularly good example to describe this idea because it is a good example of creating a lower entropy process of food procurement, which is exemplified by comparing the order and structure of the hunter-gatherer work environment to the modern farmer's work environment.

Planting the food or raising the livestock one would otherwise have to forage or hunt not only required significantly fewer calories[280], but the less productive calories of the less-fit members of the community could now contribute more value to the community at large. The output was potentially far greater with lower risk ("potentially" because early farming was less productive than hunting/gathering, but was still less work, less risk, and socially stabilizing). By all measures, the entropy of food procurement was dramatically reduced as production became more ordered and structured.
Suppose we consider that the introduction of farming also introduced many changes, such as the concept of property rights, population growth, military prowess, and more, all of which led to more complex forms of government, accounting, trade, and war. In that case, it could easily be argued that the loss of entropy that farming delivered was more than compensated for. Of course, these consequences took many years to develop. During that time, there was an *entropy-debt*, but a debt eventually balanced by the increased entropy of the consequences of this entropy-reducing invention of farming.

The idea behind *entropy-debt* is that while we accept that entropy will always increase, under certain conditions, it can decrease as long as the consequences of that decrease are guaranteed to create more entropy than what was reduced. It is similar to a bank loan, where you get money you don't have but repay it over time. The difference is, with entropy-debt, the laws of creation guarantee the balance.

In a way, we see this delayed reaction of entropy-debt in our reality as the "instant" reaction to a cause is not actually "instant", but it is at the speed of light, which *is* the speed of cause and effect. Energy leaves the Sun as its entropy increases. 8.3 minutes later, that energy lowers the entropy of the Earth. It's like an *entropy-credit* (i.e., *free-energy*, *negentropy*, *negative entropy*), but Earth doesn't get the credit for 8.3 minutes, yet that credit is as guaranteed to arrive as the Sun is guaranteed to shine… even more so, in fact, as the Sun could blink out after the energy was released and we'd still receive it (even if we are extinguished moments later).

A more abstract example is how 2×3 instantly equals 6. We could say the numbers (2, 3) and the product (6) are entangled because the product of 2×3 is not limited to the speed of cause and effect, *c*. If 2 existed in a corner the Universe, and 3 existed in the opposite corner of the Universe, it would not take 95 billions light years to multiply them. This might sound like a silly example because numbers do not exist in the material 3D world. Numbers are concepts, so they only exist in the world of archetypes, therefore, we can't apply the rules of material space-time to them. However, if 2 and 3 represented physical phenomenon, such 2 = *mass* and 3 = *acceleration*, then 6 would equal *force*, but that *force* would be limited by the speed of cause and effect.

In the archetypal world of numbers, 2×3=6 is instant, while in the physical world it is limited by *c*. The time it takes for the archetypal 6 to instantiate as *force*, in this example, represents a *debt*, as the force must eventually instantiate because it already exists in the archetypal world.

A more real-world example might be when you ask the person at the vegetable stand for 3 carrots and 2 tomatoes. It may take the vendor 30 seconds to find 3 carrots and 2 tomatoes and put them together in a bag. Your request created a *debt* that the vendor balanced with work, which in turn created a *debt* that you balanced by paying for the vegetables.

The debt part of the equation is the temporary imbalance that exists before the transactions is balanced out.

Applying this to entropy, if a transaction exists that produces more order and reduces chaos, the laws states that the consequences of that order will generate at least as much chaos as was reduced, but it will take time for that chaos to instantiate. In this way, entropy appears to be reduced, but in fact has been instantly increased, but that increase will take time to appear.

In the example of farming, a decrease in entropy will simultaneously create and/or accelerate several archetypes that will use that extra entropy, even though it may take years for those archetypes to instantiate, but that is a function of time that only matters in the material world, as described above.

What this implies is that every idea that increases order and reduces entropy will eventually create more chaos and disorder. Schrödinger (again) made a parallel observation when he specifically commented on how the order we humans create seems to create more chaos (as in the farming example above):

> *we witness the event that existing order displays the power of maintaining itself and of producing orderly events. That sounds plausible enough, though in finding it plausible, we, no doubt, draw on experience concerning social organization and other events which involve the activity of organisms. And so it might seem that something like a vicious circle is implied. - [a dragon biting its tail, the Oroboros]*

This makes perfect send if we consider that the more energy is distributed, the more opportunity (microstates) exists for (high-entropy) chaos to form. As order is a transitional condition or state of chaos, (low-entropy) chaos will always manifest before order forms, and order will always create more (high-entropy) chaos.

This tells us that the more dramatic the increase in order, the more dramatic the eventual increase if chaos. One example of this migth be the invention of digital information, which ordered just about everything, resulting in an explosion of new ideas, perspectives, beliefs, inventions, possibilities, all of which are forms of (low-entropy) chaos. The ultimate order may be AI, which would inevitably result in ultimate chaos.

Of course, in our time-limited reality, this delayed reaction always moves from cause to effect, or so we assume, but there is evidence to suggest otherwise. While there has been some debunking (the validity of which I can't attest to) of John Wheeler's *Delayed Choice Experiment* when it comes to changing the *states* of quanta in the past, there is no doubt that the experiment proves you can change the *actions* of the quanta in the past.

Here is a transcript of an interview with John Wheeler speaking about his experiment:

> *One of the most remarkable features of nature is that a Quantum can pursue two different routes through two different slits, come together, and manifest itself as a single quantum. But nothing prevents one from saying that the quantum might be a photon, to speak of quantum of radiation, or it might be an electron, to speak of a particle. A quantum can go both routes, or it can go a single route. And it's possible to choose which after the particle has already made its travel. You choose after the particle has decided whether it's going both routes or one route, and after it's got through, you yourself decide which it shall have done. You seem to intervene to change the past. But quantum theory says it can be done. And I had the pleasure to spell out some of the features of such an experimental arrangement. My University of Maryland colleague, Carroll Alley, made changes in the experiment, but without changing the principle, and carried it out. And it checked, so that we now know it is indeed true that one can decide, at the quantum level, whether an object shall go two routes to get to its final point or just one route. You can make the decision after it's already made the trip. That sounds like a contradiction, but it works.*[281] ***~John Wheeler***

John Wheeler is one of those "trusted sources" who has been to "Australia", so if he says it's there, then it's there. And if it *is* there, then that means delayed reaction works in both directions, and that means, just like there is an *entropy-credit*, there can be an *entropy-debt*, even if all we have been able to see is just a tiny bit for a moment in time.

Incoherence is nature's #1 choice regarding the distribution and balancing of energy. Still, we can find examples of coherent energy transmissions, mainly between molecules involved with photosynthesis, microtubules, quantum energy transfer, and possibly mitochondria, bacteria, and plant chloroplasts (part of a plant cell that converts light into chemical energy). This natural coherence is more common to the microworld and is also of very short duration. It exists because it is a far more efficient way to transfer a specific amount and type of energy to a specific target. Just as the energy emissions of the blob required a more organized, more structured, more coherent pattern to efficiently move energy, molecular and quantum processes also require a more coherent and efficient form of energy transfer for the same reason.

If we accept this new theory of life, then we also have to accept that the evolution of life, which includes DNA information storage and retrieval systems, is also a by-product of, and for, the movement of energy, and that sounds like a pretty big leap. However, examples of this claim are self-assembling crystals and quasi-crystals (structures that act like crystals but do not look like crystals) and are the subject of much research. DNA self-assembles similarly, and many self-assembling quasi-crystals *are* DNA.

Now consider that the primary function of anything that exists is to remain in existence and maintain a stable pattern of energy distribution within the context of its existence. Our hydrocarbon-based blobs could only evolve into life after they create a synergetic relationship with its surrounding; i.e., they will need to consume or assimilate resources and integrate with their context or environment, and that information is passed on via DNA.

Schrödinger also observed that:

> *An organism's astonishing gift of concentrating a "stream of order" on itself and thus escaping the decay into atomic chaos - of "drinking orderliness" from a suitable environment - seems to be connected with the presence of the "aperiodic solids", the chromosome molecules, which doubtless represent the highest degree of well-ordered atomic association we know of...*

In other words, the ability of living organisms to increase coherence and reduce dispersion (i.e., reduce entropy) seems to be connected with the quasi-crystals of DNA (i.e., information).

It is the DNA of life forms that determines how it will manage not only the sustainability of an organism but also the transmission of energy, especially *free-energy*, and as all the organs, including the brain, come into existence and grow in accordance with the rules recorded in the DNA. We can then say that the entire organism and its parts exist because of the DNA, which evolved to optimize and distribute the excess above and beyond what is needed for the system to remain stable.

If we are constantly being "energized" or "irradiated" by the omnipresence of A&I, how are we dissipating all the excess "energy" we are exposed to? Through increasingly complex systems of dissipation, such as consciousness, meta-consciousness, and the systems they "self-assemble". "Self-assemble" is in quotes because, from a Universal perspective, everything is self-assembled because creation and growth *is* self-assembled if we consider the Universe as the "self" that is assembling. As pattern and order become more complex, interconnected, and efficient, coherent exchange of energy will become more common, not unlike the ever-evolving *frontoparietal networks* from which consciousness emerged. Rain is a very efficient and incoherent way to distribute water, and in the past, humans hoped for rain to water the plants that they foraged. Coherent attempts were made to invoke the rain, such as praying, dancing, and sacrificing. Regardless as to the viability of such techniques, they have been around for at least 10,000 years, even among cultures that had developed writing and record-keeping[282]. Eventually, humans created far more coherent and efficient techniques that resulted in far more coherent efficient production, such as irrigation, water management, dry farming techniques, and technology.

We are partons of a larger tholon. Our ability to transfer coherent energy with technology and thought makes us part of the energy distribution system of that larger system. More than that, we are that part of this larger system because the movement of energy in that larger system has evolved to the point where it needs to produce a coherent distribution of energy. As energy is Awareness and Intentions, that translates to "the intentional directing of consciousness".

Structured Water

Given how water seems to be such an excellent tholonic medium, can we lower the entropy of water by increasing its order, adding structure in a way that matches and/or enhances the patterns of the thologram and see some differences in how it transmits or interacts with energy? If we notice any differences, we have another piece of potential evidence supporting the tholonic model.

As it happens, there is such a thing as *structured water*. *Coherent* or *Structured* water, for those who are not familiar with the term, is regular water that has been modified to give it more structure or pattern, specifically in the way that the water molecules are arranged in relation to one another, or so it is claimed.

OK, I know I probably lost some readers with this last sentence. If you do an Internet search of "structured water", one of the top results you will get is the Wikipedia entry that begins with "structured water is a term used in a marketing scam", and although that is true to the extent that anything can be a scam in the hands of scammers, the entry says nothing whatsoever on the legitimate research and testing that has been done regarding the use of structured water.

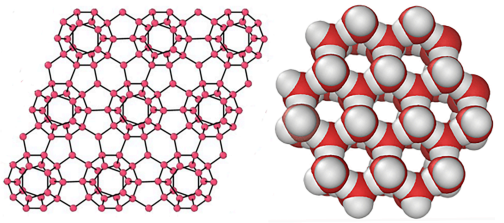
To the dogmatically skeptical, structured water is just more "swarming" of those heretically perverse "worms". However, unless one suffers from a severe case of *scolecheretiperviphobia* (fear of heretically perverse worms), they can easily find hundreds of papers, dozens of books, and scientific research from highly accredited pioneering professionals and leaders online [283] supporting the structured water phenomena. Skepticism has its place and serves a critical purpose, but regarding the extreme skepticism of structured water, that purpose does not seem to be moving understanding forward or seeking new solutions to real-world problems, such as solving global water shortages and increasing crop production, as has been well documented by some of Australia's largest produce farms.

To see the result of my own tests and how to make structured water, see *Appendix J: Structured Water*.

There is quite a lot of good research on the subject that we won't detail here. However, we will look at Fabian Ptok's Master's thesis *"Alternative Irrigation Methods: Structured Water in the context of a Growing Global Food Crisis due to Water Shortages"* [284]. He covers the subject well from an agricultural and food security perspective and provides several references to the research and work in this area. One of the often cited studies showed dramatic results in decreasing blood and DNA damage in diabetic rats, but this study is also criticized as it was small [285]. There is also a book by Professor Gerald Pollack, who has an impressive list of credentials [286] and is available online for free [287]. I have not read this book, so this is not an endorsement or recommendation, however, some of his experiments and patents [288] look very interesting. Dr. Pollack has made no claims about his work, but is raising funding to test his hypothesis that SW can have positive effect on health.

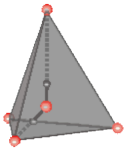
Another potentially trusted source is the work of Marcel Vogel (more on him later). He claimed that through years of work and thousands of experiments, he was able to prove that various forms of energy, including thought, could permanently change the spectrographic properties of water [289]. He also claimed that water was an information storage system. This last claim is especially significant, considering Vogel was not only a chemical and physics researcher at IBM for 27 years, but he was an information medium specialist, holding patents on hard-drive memory technologies that are in use today.

Water is an excellent test medium because the structure of molecular water is tetrahedral, and being the most basic shape of creation lends itself to many different tholonic applications. It's worth noting that when it was originally suggested that water might be tetrahedral in shape back in 1938, the idea was met with disbelief. It was not until 80 years later, in 2013, that this was finally accepted as valid. Today…



The hydrogen and oxygen that make water (left) form a compex web made of (non-equilateral) tetrahedrals. As ice (right), that tetrahedral property of water is more apparant and equilateral.

> *"It is widely accepted that liquid water structure is comprised of two closely interweaved components, i.e., tetrahedral and hexagonal structures".* [290]



In fact, water, as ice, may be the closest instance of the entire tholonic structure of any other substance (that is common to us). *(image above from "Tetrahedrality is key to the uniqueness of water"* [291]*)*

The *silicate structures* of minerals are also quiet similar in that they are made up of tetrahedrons of various arrangements. The structure of water and quartz is so close that, in some conditions, ice has the same structure as quartz [292]! While this was only discovered recently, the word "crystal" comes form the Greek word *krustallos*, meaning both *ice* and *rock crystal*, because the ancients believed quartz was permanently frozen water. This lends some credence to the metaphysical and ancient idea that water and quartz have a special relationship.

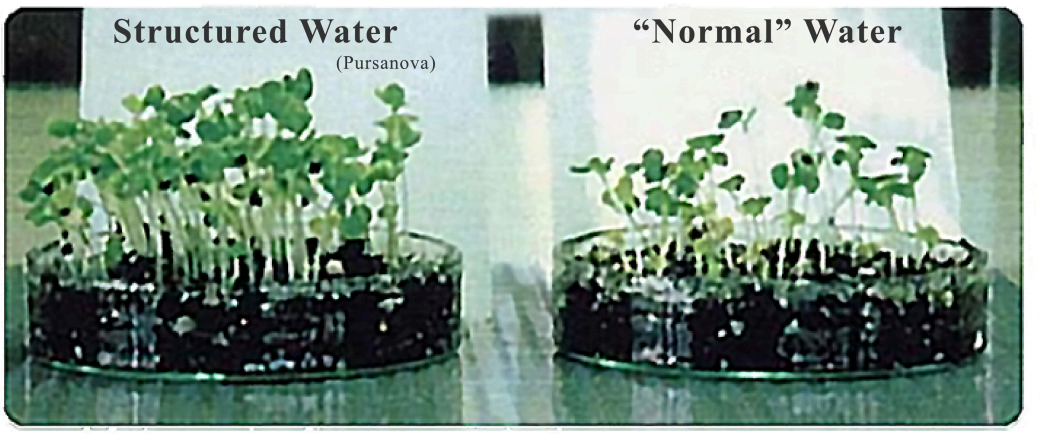
Radical ideas are often met with radical resistance. Structured water is one of those ideas, falling into the same New Age category as “crystal power”. Ignoring the 249D crystal that (possibly) created reality, common crystals have some pretty impressive qualities.

- Generate electricity (piezoelectric).
- Amplify, transmit, and store data (up to 300 million years [293]).
- Generate signals (used in microchips, watches, internet routers and network controllers, satellites, up to billions of cycles per second).
- Control the transmission and phase of light (liquid crystal displays - LCDs)
- Ability to alter time (yes! They are called *time crystals*, representing a new state of matter, according to MIT. [294])
- Ability to hold a magnetic charge.

Crystals can do all these amazing things because of the structure of the elements that make a crystal, and water, with its tetrahedral structure, is like a liquid crystal. As we have stated, energy creates order, and movement is the effect of energy. Therefore, adding energy via movement to a tetrahedral liquid, such as water, will positively or reinforce its structure. Being a more efficient conduit for transferring energy, that structure will likewise affect that which interacts with it by transferring more energy.

The hypothesis is that we should see measurable effects simply by causing movement to commercial water (tap or bottled).

In Ptok’s Master’s thesis mentioned above, the author examines various tests that grew different plants using tap water and structured water.



One of his findings was that structured water increased alfalfa growth by 15.1%. This may not sound like much, but in the U.S. alone, a 15% increase in alfalfa growth represents an additional 20,700,000 tons of alfalfa, which has a value of over 4 billion dollars. Similarly, some of Australia’s largest produce farms reported needing 25% less water to produce a superior product than traditional water [295]. In the tholonic model, these examples also apply to concepts, intelligence, ideas, and of course, ideologies, be they scientific, spiritual, or political.

Review of studies

There have been several studies of SW using animals. One review does a meta-analysis of these studies, "*Structured Water: effects on animals*". [296]

> *This review focuses on the effects of structured water on animals when it is consumed on a daily basis. Structured water is liquid water that is given altered H-bonding structure by treatment with various forms of energy including magnetic fields and light. While most of the research has been conducted on magnetized' water, which has structure of short duration, recent research has examined effects of a structured water with stability of at least 3.5 months.*

Conclusion:

> *The animal research conducted to date consistently demonstrated beneficial effects of SW consumption.*

There is another conclusion that also needs to be looked at, and that is the inability for some people, including scientists, to accept the possibility, or worse, attack not only any finding, but even the question as "worms of heretical perversity!". It almost as if science is suffering of *sophophobia* (fear of learning), or worse, *rogophobia*(fear of asking questions).

An example of this is the very simple "experiment" produced by IKEA (yes, the furniture store), where they placed 2 identical plants side by side for 30 days in many K-12 GEMS schools (Global Education Management Systems [297]) across the United Arab Emirates (U.A.E). Signs near each plant instructed the viewer to either "compliment" the plant (right) or "bully" the plant (left). The short YouTube video [298] had 1.2 million views, with 6,700 likes and 625 dislikes, and many of the comments were as vile as YouTube will allow. Granted, this exhibition will never get published in the *Journal for Experimental Science*, but it the clearest demonstration of the concept.

It is certainly sufficient to raise the question, "Do emotions effect life?" which sounds like a ridiculously silly question, as we all know the answer. Still, while there are countless studies on the effect of plants on human emotions, there is nary a one (that I can find) on the impact of human emotions on plants. This is unfortunate, as such a study would tell us a lot about the emotions/biology connection that presumably would have some effect on human's often emotionally chaotic, fear-driven, culturally distorted minds. Unfortunately, the anger and dismissive attitudes expressed in the comments of this video are shared by many leaders in the scientific community, which can, at times, acts like a cult of scientism.

Gravity

If it is true, as mentioned in *Chapter 11: Fields*, that gravity and Awareness are two instances of teh same archetype, then we should be able to adapt experiments on gravity to Awareness. We could start with the first experiment to measure the force of gravity between masses in 1797, the *Cavendish experiment*. This experiment was the first to determine accurate values for the gravitational constant (G).

As a reminder, in *Chapter 11* we correlated the following properties:

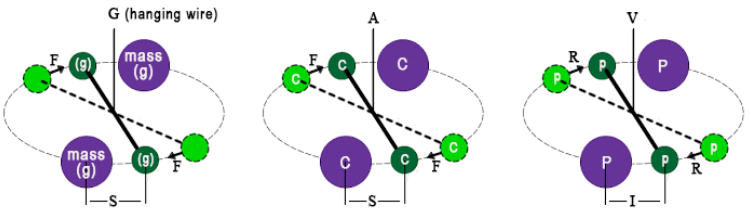
- Gravitational constant (G) -> volts (V)
- Gravitational field of mass (g) -> power (P), energy transfer over time.
- Force of gravity (F) -> resistance (R)
- Distance (S) -> current (I)

The Cavendish experiment is both simple and fascinating. Simply hang a balanced bar holding two masses from a string and let them rest. Then place large masses, such as bowling balls, next to each mass on each side, and watch the balanced masses get drawn to the bowling balls due the gravitational field of the bowling balls.

Now, if we correlate according to our initial associations (“initial” because these will certainly need tweaking and adjusting):

- Awareness (A) -> Gravitational constant (G)
- Consciousness (C) -> Gravitational field of mass (g)

We end up with a models that look like:



This tholonic model experiment suggests that a “small” consciousness” will be attracted to a “large”, which might make sense, but is difficult to test as we have no standardized metric for consciousness, either individual, collective, hive, or otherwise. We have the concept of an expanded consciousness, which correlates to problem solving, planning, and reasoning, but as this applies as much to bee hives and ants as it does to humans or plants, we still have the same problem. nevertheless, this is a potential example of shifting the concept of gravity to Awareness.

Other Experiments

Here is a very short list of books and papers that delve into experiments and perspectives that explore awareness and reality and are compatible with tholonic claims:

- *Double-Blind Test of the Effects of Distant Intention on Water Crystal Forma-*

tion. [299]

- *FieldREG Anomalies in Group Situations.* [300]
- *Test of a field theory of consciousness and social change.* [301]
- *International Peace Project in the Middle East: The Effects of the Maharishi Technology of the Unified Field.* [302]
- *The Intention Experiment,* Lynne McTaggart
- *Groundbreaking New Results in Consciousness, Quantum Brain & Nonlocality Research,* Maoxin Wu
- *Conditioning of Space-Time: The Relationship between Experimental Entanglement, Space-Memory and Consciousness. Journal of Nonlocality Round Table Series, Colloquium #4*, Rajendra Bajpai and +2
- *Radiant Minds: Scientists Explore the Dimensions of Consciousness*, Juanita Ratner
- *Extrasensory perception and quantum models of cognition*, Patrizio Tressoldi and +2
- *The relationship between local geomagnetic activity, Tibetan Buddhist meditation and psychic awareness: Preliminary study*, David Luke
- *Phenomenological Convergence between Major Paradigms of Classic Parapsychology and Cross-Cultural Practices: An Exploration of Paranthropology*, Jack Hunter
- *An investigation into the cortical electrophysiology of remote staring detection*, Paul Stevens
- *Geomagnetic Field Effects in Anomalous Dreams and the Akashic Field*, Stanley Krippner
- *The relationship between local geomagnetic activity, meditation and psi. Part I: Literature review and theoretical model*, David Luke and +1
- *Eleonore Zugun: the Re-Evaluation of a Historic RSPK (Recurrent Spontaneous Psychokinesis) Case*, Peter Mulacz
- *Intention,* Jeanne Lim

Qualitative Energy

One experiment to consider is the concept of *qualitative energy*. We have countless ways to test the quantitative properties of energy, but if we claim that quantitative and qualitative properties are related in some way, then can one property affect the other, for example, via induction?

Measuring the value of money is quantitative, so a $10 bill is always $10 regardless if it came from a blood diamond or a farmer, but many people would reject that $10 if they knew it was from blood diamonds. This particular qualitative example has had significant quantitative effects as it has shifted over $1,000,000,000 away from the blood diamond industry. Does that make the *value* of the money qualitative? Subjectively, yes, for those whose values are qualitative. A Central Bank, for example, only values quantitative measures, so qualitative values don't register. The fact that they pretend they do is evidence that living organisms value qualitative measures.

Trustless systems are changing that. A trustless system is :

> *A mechanism in place where all participants can reach a consensus on a single truth without any one overarching authority and without needing to know or trust each other.*

The Universe, nature, creation… these are trustless systems, and the "single truth" that emerges is the reality of the moment, whatever that happens to be.

Cryptocurrencies are trustless, which, unfortunately, doesn't make the cryptocurrency institutions, users, exchanges, or markets any more trustworthy than those of traditional finance. However, we are seeing currencies whose value is hugely influenced by the service they provide, such as cryptocurrencies specifically bound to agriculture (SOYA, CORA, WHEA), precious metals (XAUT, DGX, GLC, PMGT, LKNS), marijuana (POT, CANN, DOPE), and even pornography (PORNCOIN). There are coins based on political and ideological goals, such as privacy (XRP), political candidates (FJB, LGB), religions (BBP, CT). There are more than 19,000 cryptocurrencies at the time of this writing, each with its underlying philosophy, vision, goals, and values. These new infant currencies demonstrate the bond between quantitative and qualitative values and how these qualities can induce changes in the other.

By the same token (pun intended), and because money is an abstract representation of energy, we can extend this idea to energy in general and ask, "can qualitative attributes affect quantitative measures, or visa versa?", "Is there such a thing as qualitative induction?"

Tholonically, the answer is "yes", and experiments can easily be designed to test that, such as a laboratory version of the IKEA experiment or the "Florence Experiment", where plants are subjected to "fun" or "depressing" humans emotions at the *Palazzo Strozzi* Renaissance palace of art in Florence, Italy.

Intelligence can also be considered a qualitative property, even in the traditional sense of "the ability to learn or understand or to deal with new or trying situations", especially as the creation of life on a dead planet is about as trying as it gets. We can take it further with the traditional definition of intelligence of "The ability to learn, understand, and make judgments or have opinions that are based on reason" if we presume the tholonic intelligence that instantiated in plant life has the ability to learn, understand, make judgments, reason and even have opinions. Now, apply the tholonic definition of "understanding", i.e., "the knowledge of something sufficient enough to be able to make verifiably accurate statements regarding said thing", and we can also claim that a tholon has knowledge. We see an instance of this in how every form of life is accurately described by the knowledge data-storage medium of RNA/DNA (which may have existed long before life itself).

Note that the tholonic definition of intelligence…

> *The ability to maintain a sustainable energy patterns within the scope of its existence.*

… implicitly includes the traditional definitions, and where “reason” extends beyond current human reasoning. As patterns come from order, which is the result of energy, and energy is awareness, then, by this reasoning, intelligence is synonymous with “ordered or structured awareness.”

Some of the more forward thinking claims that plants are intelligent is entirely compatible with the tholonic model[303, 304]. Even Charles Darwin’s and his contextually limited worldview of the 1870s come to similar conclusions.

> *“it’s hardly an exaggeration to say that the tip of the radicle (the first part of a seedling to emerge from the seed during the process of germination) thus endowed, and having the power of directing movements of the adjoining parts, acts like a brain of one of the lower animals.”* ***~Charles Darwin, “The Power of Movement in Plants” (1880)***

What is surprising is that our current world-view continues to be based on the erroneous concepts passed down by the likes of Aristotle, who wrote in “De Anima” that plants have a “low level”, “vegetative soul” because they are incapable of local movement and ability to sense. Like his claims about gravity, both statements are observably wrong, even to the ancient Greeks, had he bothered actually to investigate.

Language and Metaphysics

It is well known that language can hold a social order together or destroy it. Language has such power because the order and hierarchy of concepts that form a social order are known, taught, and defined by words. In addition, words and language form neurological pathways in our brain, and these pathways exert physiological pressure on the physical structure of the language-processing part of the brain. In his *Generative-transformational Theory* of language, the brilliant linguist Noam Chomsky states that children are born with a hard-wired understanding of language, and the only thing they need to learn is the context of how that innate understanding is culturally expressed.

Anecdotal to Chomsky’s point, my son was never taught to read or write, raised in a house without TV, radio, or internet, and in a rural environment. He was exposed to a Rudolf Steiner-esq form of learning where he was not “taught” but rather “exposed”, allowing his innate knowledge to manifest naturally. When he entered public school at the age of 8 or 9, his reading and writing abilities far exceeded those of his classmates.

It must be stated that while the first casualty of war may be truth, the first act of war is an attack on language and words, which begins long before the shooting starts. One example of such a salvo aimed at Western Culture is the post-modern concept of language and the redefining of words. This very successful neo-Marxist offensive began in the 1960s and has been so successful that by 2022 even a U.S. Supreme Court Justice was unable to define the word “woman”, and this view was staunchly

supported by the largest publishing company in the U.S., who unironically reported "[her] answer was scientifically sound. There is no sufficient way to clearly define what makes someone a woman." [305]

Words and language are fundamental to psychology, communications, behavior, culture, cognition, relationships, perception, identity, politics, and just about all aspects of society. Consequently, describing ideas that use concepts outside our vernacular is challenging. The only solution is to define new concepts and create new words for them. Last year, 20 new words were added to the dictionary, including "ecoanxiety", "Dunning-Kruger", "hodophobia" (fear of traveling), "nothingburger", "ratio" (as in "dude, you got ratio-ed"; likes/dislikes of a social media post). The words we create and how we use words, in general, might be a good indicator of where society is headed. At least, that is the concept behind *predictive linguistics*. The problem with predictive linguistics, and words/language in general, is that each person's different experience with words invokes a different qualitative context [306], so even if everyone agrees on what the word "walk" means, it does not mean that word will invoke the same subjective context. The context will determine that word's psychological, emotional, typically unconscious or "right brain" meaning. All of us have experienced this, usually with scents, places, or things, but it also applies to words/language.

Scientific or technical words are the easiest to create because they can be clearly and definitively described. Words to convey emotions or beliefs are more challenging as they are subjective. Still, as we all have feelings and beliefs, we can all generally agree on words like "love", "fear", "spirit", and "freedom", but the specifics of these words will never be agreed upon. It's even harder to define new words for existential or esoteric concepts, such as "awareness", "consciousness", "soul", and "god", or the metaphysical aspects of concepts like "intention", "free-will", and "being". The most challenging concepts to describe are those that are simultaneously technical, emotional, and metaphysical, such as the concept of energy. Energy is everything that is, can be, and will ever be. By "everything", I mean *everything*, which includes consciousness and awareness, intentions, cause and effect, space-time, spirit, soul, free-will, and anything else you, or anyone who ever did, is or will live, can imagine.

To describe such things, we can invent new words, but unless you are a cultural icon, world leader, or brilliant scientist with the support of the media, your new words will remain a mystery. Many new word creations were serendipitous and accidental, such as the word "malapropism" (nonsensical, often humorous utterance), which is an adaptation of the name of a character, *Mrs. Malaprop*, from the 1775 play "The Rivals". Even the word "serendipity" was invented by writer and politician Horace Walpole in 1754 as an allusion to *Serendip*, an old name for Sri Lanka. "Banana republic", "catch-22", "bedazzled", "beatnik", and "cyberspace" were all invented words that found a home in the collective consciousness of our culture because we could all recognize and agree on their meaning and agree that it filled a need. Creating a new word that describes a state of understanding is rare. However, this was accomplished by Robert Heinlein, who had to write an entire book ("Stranger in a Strange Land", 1961) to describe the nuanced definition of the word "grok". Even then, the definition has been drastically reduced to a simple sentence; "*To understand intuitively or by empathy, to establish rapport with; also, to empathize or communicate sympathetically (with); also, to experience enjoyment*".

Short of inventing new words, we can use existing words as a representative, symbolic, and metaphorical allusions to describe metaphysical, supernatural, or existential concepts. Some languages are better suited for this so that we can appropriate their words into our vernacular, such as “chi”, “chakras”, “Tao”, “gestalt”, “karma”, “mantra”, “yoga”, and “prana”.

How, then, can we talk about such broad and elusive concepts as A&I in a way that all can understand? The best we can do is use the simplest words possible, leaving less room for wildly differing interpretations. At the most fundamental level, A&I can be described as “I Am” and “I Will”. It doesn’t get more basic than that, but as we’ll see, these concepts are anything but simple.

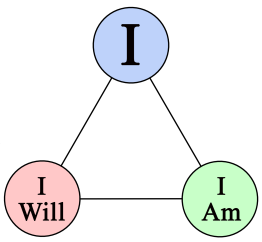
In the thologram, we have the concept of a 0-dimensional point which only has 2 attributes, A&I. Linguistically, the singularity of that point can only be described as that which “is”, and the nothingness in which it resides is that which “is not”. This is the 1st duality of *somethingness* and *nothingness* which describes a state of existence or “being”. Applied to subjective or 1st person context of “to be”, these would be “Not I” and “I am”, or, to borrow the opening words of the most widely known and quoted lines in modern English literature:

> *“To be, or not to be”* ***~“Hamlet”, William Shakespeare, 1600***

We now have these 2 objective concepts, “is not”, “is”. These concepts are instances of (or lack of) Awareness, as the only prerequisite for some “thing” to exist is the awareness of its existence, as in a 0-dimensional dot. Here, a “thing” can “exist” as no more that a concept, but that concept can even be the concept of awareness! For something to exist as a concept, it does not need any other qualifier other than “to be”. It doesn’t need to “do” anything, nor does it need a purpose, reason, or rationale to exist. Thus, the only difference between “is “ and “is not” is the intention “to be”.

This should sound familiar as we briefly touched on the same theme in *Chapter 7, Structure*. The association between the thologram and ancient spiritual concepts was never intended, but it was inevitable as both models are based on the same laws of existence.

Awareness is the primal state of existence and instantiates as consciousness, which, in the 1st person human context is “I”. Intention is the primal force which created the primal movement, the 1st cause that started the chain reaction of causes and effects instantiates as movement/energy and “I will”.



Regardless that these concepts have been, and continue to be, hotly debated as to their true meaning, they are the most fundamental and straightforward concepts we have yet to conceive of. They also match our original tholonic trinity of the N-state/Negotiation/balance (“I/is”), Definition/limitation (“I am/to be”), and Contribution/integration/form (“I Will/will be”).

Language not only dictates cultural values and beliefs, but it is also inextricably linked to the formation of human consciousness[307, 308, 309]. Hence, the limitation of languages will be reflected in the limits of consciousness (and vice versa). For example, along with our brain's high evolved *frontoparietal networks* ability to conceive of the concept of "I" was the conception of "Not I". These concepts are very effective in helping the brain do what is has evolved to do, which is "*encode and integrate information acquired from the environment through sensory inputs, and then generate adaptive behavioral responses*". The reason such concepts could even be conceived is that the most fundamental reasoning process in any brain is to distinguish between "that which is" vs. "that which is not". A bee knows "this is (a flower)" from "this is not (a flower)", and even ants have shown they can recognize themselves in a mirror[310] (which is not the same as having a concept of "I", although they clearly have a concept of "us" give that the individual ants act like neurons in a collective brain, or superorganism [311]). This is not to say that each ant is aware of it's position in this superorganism, simply that the concept of "us" exists at the archetypal level.

Even the simplest form of life that exists, the "JCVI-syn3.0", which is the 1st designer organism in history and has only 473 genes[312], "knows" how to differentiate between "what is" and "what is not" and does so much better than the scientists who created it. We know this because there are 79 genes in this organism that are required for the cell to continue living, but no one has any idea why they are there or what they do. The organism "knows" they need to exist; otherwise, it would not have created them.

It is reasonable, then, to presume that the simplest relationship that can be recognized is between that which "is" and that which "is not". Thus, the concept of "I/Not I" would be the 1st relationship that the *frontoparietal networks* could form once it conceived of "I". Given that this concept has been around for about 5 million years, it must have a pretty good track record of "*generating adaptive behavioral responses*". The "problem" with the concept of "I/Not I" is that it is based on, or rather an evolution of, the fundamental concept of existence, that of "is/not is", which is built into all life. This makes sense as far as rules of logic go, but that does not mean it has anything to do with reality. As far as the brain is concerned, reality is whatever it can logically deduce from experience and the senses (of which only 5 get any attention, thanks to Aristotle).

A more objective view of reality tells us that it is the culmination of all that came before and the current state of an ever-changing system that has been around for 4.5 billion years. While logic may be a part of reality, just as order is a part of chaos, that does not mean that all of reality abides by the rules of whatever limited version of logic the brain has so far deduced. Consequently, that which "is not" is that which does not exist, therefore when there is no more I, "I" ceases to exist, and "I", being purely a utilitarian construct of the *frontoparietal network* which is only interested in "*generating adaptive behavioral responses*", can only conclude that the end of "I" is death, as "Not I" is the end of existence. While it is true in the sense that the brain's existence comes to an end, from a tholonic view, even though the tholonic intelligence of one's existence comes to an end at some point, that point is not necessarily at physical death. Regardless when it comes to an end, the A&I of that intelligence can

only come to an end when all of existence, in all dimensions and forms, comes to an end. Given that A&I is not a space-time phenomenon, it may exist eternally, in the space-time context.

Such concepts are reinforced and passed on via language, which forms our human consciousness and understanding of reality, which is why humans tend to believe that death is the end of our existence. Metaphorically speaking, the brain (and body in general), is like an organic form of artificial intelligence whose primary objective is self-preservation, so we should expect that everything it creates is designed to support that agenda.

We can't blame the *frontoparietal network* for doing its very impressive job, especially as it has also managed to create meta-physical concepts of relationships beyond our physical reality, much to Aristotle's chagrin, I imagine. These meta concepts appeared shortly (~2 million years) after the *frontoparietal network* formed the concepts of "I am/I am not" and, I suspect, were closely related to and driven by our hopes and fears. Hopes and fears are probably the 2nd most vital driving force in human existence after life and death.

The concept of "I am" is not only the basis for human consciousness as we currently know it but also the basis of the concept of "The Creator" as we currently conceive it. In this sense, Man *was* made in the image of God, as "I am" is an instance of the archetype "To Be".

Why are we getting into this linguistic linguine? Because language is a living map of understanding, but like all maps, it tends to hide the reality of the terrain. We can see this in the simplest concepts of "I Am" and "I Will", which have laid the foundation of our concepts of who we are, but of God and the Universe as well. While this is not a book about religion, spirituality, or metaphysics, per se, it is impossible to avoid these topics when speaking about such broad and encompassing concepts as awareness, intentions, energy, and reality. Serious researchers would inevitably find themselves in a territory outside of their discipline with radically different perspectives and beliefs. We can integrate these different worlds through the filter of reasoning and the humility to accept that there is far more to reality than any one perspective can describe. With this in mind, let's look at one of the earliest and most influential concepts of existence; God.

Note: For more on the tholonic view of the concept "I Am", see section "I Am" in Appendix L, "The Thologram and Religion".

Are Archetypes Alive?

If ideas are archetypes with energy and fields, then it would be reasonable to think that an idea could be reinforced and strengthened by adding more energy. How would one go about adding energy to an idea? If awareness is energy, then one obvious way would be to increase an idea's exposure to more awareness. This sort of thing is done all the time. We can see it in politics, media, culture, and traditions, even National Prayer Day in the U.S. (May 7th) when the President signs a proclamation

encouraging all Americans to pray on this day and “turn to God”. Now, imagine the potential power of 114,000,000 consciousnesses all being exposed to the same symbolism at the same time, such as any of the bizarre Super Bowl half-time shows, or the 635,000,000 views of the Apollo 11 moon landing, or the London/Philadelphia Live Aid event with its 1.9 billion viewers, or the 9/11 attack on the Twin Towers which was most-viewed television event in history, or the EU’s reality TV singing competition “Idols” that captured 3.2 billion viewers. That is half the population of the planet

Considering that the average American youth spends 900 hours a year in school, another 1,200 hours a year watching television, that 70% of the American adult waking life is spent in front of digital media [313] and that the average 78.6-year-old American will spend 9 years of his life watching TV, 2 years of which is just watching commercials, we’re talking about a tremendous amount of awareness, billions and billions of hours, up for grabs. How is that currently being used? Compared to the test results of the *Maharishi Effect* and its 4,000 participants, it’s hard to imagine the possibilities within reach as a global community.

Even if producers and broadcasters of media were oblivious to the power of collective awareness, which I suspect all but a few are, that much concentrated, coherent, focused awareness is naturally going energize all sorts of “fields”, similar to how the thermal hot springs brought life to bio-goo. In the tholonic model, intelligences will outright vie for that energy, especially the less sustainable and parasitic forms of intelligence, as those tend to be far more energy greedy.

With the Internet and the decentralization of social media, we have seen a mad scramble for attention-mining and a dramatic and inevitable polarization of ideologies, beliefs, and agendas with equally desperate, dangerous, and even deadly attempts to control that attention.

We are seeing tremendous amounts of conscious and unconscious awareness being pumped into ideas, beliefs, symbols, memes, etc., many of which have existing archetypes and, therefore, according to the tholonic model, their own awareness, intention, and intelligence.

A suspicious person might begin to suspect that some less-than-noble folks may already understand the manipulation of awareness as energy. Others may think this is bordering on the tin-foil-hat territory of mystical conspiracy theories. The reader will come to their own conclusions. Our intention is to question the effects of such awareness harvesting, especially in light of the understanding that ideas have a life of their own. This includes ancient ideas, even if they seem to have been forgotten by modern society.

With that said, it must also be noted that magic and mysticism also follow as strict a set of rules and reasoning as science, if not more strict, if you consider that some magic rituals can take many months, are physically challenging to the point of being life-threatening, and leave no room for error, at least according to one of the more well-known grimoires [314]. A significant difference between science and mysticism is that science is based on observations and relationships of the external and physical reality, while mysticism depends on the observations and relationships with non-physical reality. This may sound like nonsense to some, but consider that near-death

experiences (NDEs)[315] are reported by about 17% of those who nearly die, of which only 0.1% believed the experience was not real, [316] and out-of-body experiences are reported by 10% of the population globally [317]. These statistically significant numbers are not easy to brush off. An even more significant statistic is that out of the 7.87 billion people on the planet, 7.6 billion of them (96%) believe in some spiritual concept that, by definition, is not based on objective, physical reality.

While it is true that the laws of reality are not subject to popular opinion, political and economic pressure, and self-interest, it is definitely the case that the practice of science is. We can see an example of this in how 0.11% of the world's population (the 8.8 million scientists[318]) feel they have the intellectual authority to tell the other 7.87 billion people they share the planet with that they are deluded, ignorant, gullible (the official term is the "Barnum effect"[319], i.e., "suckers"), or simply *wrong* in how they perceive their relationship with reality. Unreasonable as these presumptions may be, it is common and supported by the scientific community[320] and research funding.

It should also be pointed out that many scientific breakthroughs had a mystical or paranormal ingredient. We have seen how Newton was a dedicated alchemist and how Kekulé's vision of an ancient mystical symbol changed organic chemistry. Einstein, though not overtly a follower of any religion, was deeply spiritual and a self-proclaimed disciple of Spinoza a (1632-1677), the 17th century Jewish philosopher and mystic, and admitted his Theory of Relativity was a result of his belief that there existed an unknown and mysterious force behind the "harmony of the universe"[321] and …

> *"behind all the discernible laws and connections, there remains something subtle, intangible, and inexplicable. Veneration for this force beyond anything that we can comprehend is my religion."* ***~ Albert Einstein***

Furthermore, he believed that true science was to be a path of spiritual understanding: >"Science can be created only by those who are thoroughly imbued with the aspiration toward truth and understanding. This source of feeling, however, springs from the sphere of religion." > >"Everyone who is seriously involved in the pursuit of science becomes convinced that a spirit is manifest in the laws of the Universe—a spirit vastly superior to that of man, and one in the face of which we with our modest powers must feel humble. In this way the pursuit of science leads to a religious feeling of a special sort, which is indeed quite different from the religiosity of someone more naïve."

> *"I assert that the cosmic religious experience is the strongest and noblest driving force behind scientific research… The religious geniuses of all ages have been distinguished by this kind of religious feeling, which knows no dogma and no God conceived in man's image. In my view it is the most important function of art and science to awaken this feeling and keep it alive in those who are receptive to it."* ***~ Albert Einstein***

Carl Jung was not simply mystically inclined; he was a genuine mystic. As a child, Jung's life was filled with paranormal events.[322]

These lived experiences led Jung into psychology, and why his dissertation published in 1902 was titled "On the Psychology and Pathology of So-Called Occult Phenomena" [323]. His ideas would open a new path to understanding the mind and consciousness.

As an adult, Jung had visions and heard voices that lasted hours, left him ill and weak, and made him think he might be schizophrenic, that is, until his visions turned out to be prophetic only months later when World War I broke out:

> *I saw yellow waves, swimming rubble, and the death of thousands... two weeks passed then the visions returned, still more violent than before, and an inner voice spoke: "Look at it, it is completely real, and it will come to pass. You cannot doubt this".* ***~Carl Jung, The Red Book***

Jung was also quite clear that the paranormal exists, and science is at a loss to explain it and has little interest as well, as he states in the forward he wrote for Aniela Jaffe's "Apparitions and precognition" [324]:

> *One of the most notable things... is the fact that among the Swiss, who are commonly regarded as stolid, unimaginative, rationalistic and materialistic, there are just as many ghost stories and such like as, say, in England or Ireland. Indeed, as I know from my own experience and that of other investigators, magic as practiced in the Middle Ages and harking back to much remoter times has by no means died out, but still nourishes today as rampantly as it did centuries ago. One doesn't speak of these things, however, they simply happen, and the intellectuals know nothing of them-for intellectuals know neither themselves nor people as they really are. In the world of the latter, without their being conscious of it, the life of the centuries lives on, and things are continually happening that have accompanied human life from time immemorial: premonitions, foreknowledge, second sight, hauntings, ghosts, return of the dead, bewitching, sorcery, magic spells, etc. Naturally enough our scientific age wants to know whether such things are "true", without taking into account what the nature of any such proof would have to be and how it could be furnished.* ***~ Carl Jung, "Bilder und Symbole aus E.T.A. Hoffmanns Marchen 'Der goldne Topf"***

The arenas of science and mysticism share many territories, and their difference can sometimes be purely semantic.

We accept that the Sun is our planet's energy source and is extraterrestrial. Still, we don't consider the Sun an "extraterrestrial energy being" like our ancient ancestors. However, let's consider that there is a Sun intelligence, given that the Sun exhibits the properties of intelligence (as we defined it earlier, and certainly, the Sun is as "intelligent" as some lab-grown hydrogel). We could say the Sun is an "extraterrestrial energy intelligence" and still perfectly within the boundaries of scientific reasoning.

A science that does not explore beyond the physical is trapped in a dark cave of materialism. The tholonic view is that we have the ability to tap into these non-physical archetypal intelligences, and often do unconsciously. This is the purpose and power of myths, be they ancient or modern, as well as totems, rituals, rites, superstitions,

magic, Wicca, paganism, religion, animism, etc., and with the advent of global media, we will see a renaissance of these concepts emerge in the context of our modern culture.

As these archetypes exist in the uninstantiated tholonic state, they are free from the limitations of our space-time reality. The myths and beliefs of the ancient past continue to live on in ever-evolving meaning and symbolism that promote their existence, almost like a self-mutating virus that has to constantly adapt to the context it exists within.

Much of our everyday culture is inextricably bound to these archetypes. Jung described these archetypes as *ordering factors* in the collective unconscious, such as his 12 archetypes of the human psyche organized into 4 cardinal types, which we described earlier. We can find these *ordering factors* in every context of existence.

A cultural example might be how the *ordering factor* of *cooperation/conflict* instantiates as a social concept of "*Heinous deeds will be punished*". In the context of Norse theology, this concept instantiated as the goddess named *Hel*. Her job was to judge the dead and help the apocalypse along by leading an army of the dead in a ship made of the fingernails of corpses. This is where the modern word "hell" comes from. This was also the word chosen as the literary translation (in the King James Bible) of the Hebrew word "Géenna" which meant "valley of Hinnom", which was where the waste of Jerusalem was dumped. This same *ordering factor* appears in cultural concepts such as karma, judgment day, guilt, original sin, and many other forms.

The concept of *hell*, or whatever it happens to be called, is deeply ingrained into the worldview and collective conscious (and unconscious) of billions of people who have little knowledge of the roots of their beliefs. Through the energy of their awareness, these believers bring into creation associated and/or parasitic archetypes that are attached to primary archetypes of which they are entirely unaware but which are energized by that awareness nevertheless. This suggests that the more awareness directed at the specific concept of *hell*, the more energized the attached concept of an apocalypse becomes, as they are both tholonic archetypes that have a shared existence.

As a way to convey concepts, language is a microcosm of how archetypes merge, evolve, and reproduce. An example would be how we can draw a straight line of connection from the invention of hieroglyphics and moon worship to pharmaceutical drugs and those vacuum-sealed plastic bags of imported Colombian coffee you buy at the supermarket, connecting along the way with magicians, pyramids, thieves and secret societies.

The super-short version goes something like this: The Egyptian moon god, Thoth, who invented hieroglyphics, was adopted by the Greeks, who called him Hermes. Among other things, Hermes was the protector of thieves. He carried the Caduceus, which became the symbol of modern medicine, and was the founder of the super-secret mystical teachings of Hermetism. So protected were these teachings that the word *hermetic* became synonymous with *perfectly sealed*, hence, *hermetically sealed* bags.

What we have referred to as an uninstantiated tholon can be considered a type of *metameme*. A *meme* is defined as "*an idea, behavior, style, or usage that spreads from person to person within a culture*". A *metameme* is an "an idea or belief formed within the tholonic field (i.e. universal mind, collective unconscious, morphic field, etc.) and spreads from tholonic field to tholonic field or archetypes to arch". This would be a *meme* that only exists in the collective unconscious and/or in the world of archetypes.

You may have heard phrases like "*If it looks like a duck and quacks like a duck, its probably a duck.*", "*When you hear hooves, think horses, not zebras.*", or "*The simplest explanation is most likely the right one*", otherwise known as *Occam's Razor*. Applying the wisdom of these *abductive reasonings*, what are we to make of the fact that research out of Princeton University supports the theory that ideas, in the form of social media networks, follow the same growth models as viruses (in the form of diseases)? [325]

Outside of the conclusion that perhaps Facebook and Twitter are some form of viral disease, it tells us that ideas follow the same patterns as existing natural growth patterns, suggesting we might learn more about the life of archetypes if we considered them living. OK, viruses *may* not be "alive", but I say *may* because some experts in the field are redefining "life" to include viruses. [326, 327] Regardless, the growth, survival, and creation of ideas follow the same patterns as everything else that grows, survives, and creates. For this reason, a clever researcher might be able to find correlations between the life cycle of a galaxy and something as seemingly unrelated as, say, the life cycle of a tomato plant.

One such researcher might be Tokyo Institute of Technology's Maruyama Shigenori, a Leading geophysicist and founder of the *Center for Bio-Earth Planetology*, who, by connecting the theories of astronomy with those of the life sciences, has shown how entire planets may well be living super-organisms. Another effort is from Department of Physics and Astronomy researchers at the University of Kansas who theorize on the relationship between biodiversity and cosmic rays [328].

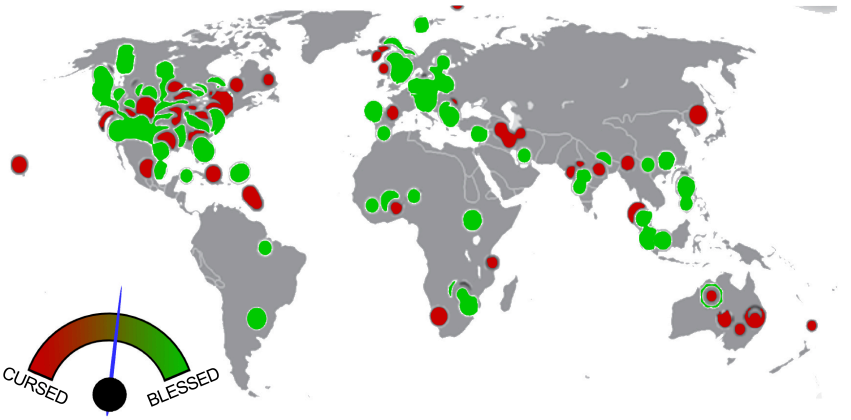
It's quite surprising that these new ideas are considered ground-breaking or radical in the science community considering as our own biological processes, such as sleeping, menstruating, secretion of the melatonin from the pineal gland, stress levels, memory and genetic encodings [329] are driven and controlled by cosmic conditions such as the Sun, Moon, the spinning of the earth, and even energies from the Milky Way and far off supernovas.

However, this idea that archetypes are alive raises some concerns regarding mechanics of reality and consciousness as we can find countless examples of how these imposed archetypes infiltrate our understanding and view of the world, such as the most powerful laser in the world named after the Hindu god of destruction to trivial tarot cards based on movie stars.

So, what kind of world are we creating with our awareness, desires, and beliefs as a planet? To find out, I wrote a mobile phone app that allows people to send out a blessing or a curse into the "ether". The app was creatively named "Bless or Curse".

The majority of both blesses and curses are about… wait for it… love, money, and health (surprise!). Some were touching, such as the blessing of "May he win lotto" cast upon the bus driver who "stopped just for me". Some are bizarrely dark, such as the curse of "Torture Rape Murder die die die die die," cast upon "Noisy Walgreen Employees". The predominant *cursers*, were Iran, Southern Australia, Puerto Rico, Russia/North Korean border, western South Africa, and Honolulu. Predominant *blessers* were northwest Canada, southwest U.S., Eastern Europe, South Pacific, Uruguay, Ghana/Burkina Faso, Ethiopia, and the jungles of Northern Brazil.

The micro-sample of humanity seemed to be split down the middle between the *blessers* and the *cursers*, as seen in the report map below. In general, it tended to hover over the 53% area, giving the *blessers* a slight edge over the *cursers*.



Tulpas

One of the better legends of how ideas can take on a life of their own comes from the well-known 1932 book, *Magic And Mystery In Tibet*, by Belgian-French explorer Alexandra David-Néel.

In the Far East, there is the concept of a *tulpa*, which is a type of thought form. They are understood to be a sentient consciousness that resides in the host's brain and can have separate feelings, thoughts, and memories from the host and communicate through thought, imagination, feelings, or verbally. With enough practice and concentration, the host can see the tulpa's form in the real world, and for the truly advanced *tulpamancer*, it can be seen by others as well. Of course, this is a preposterous idea to Western thinkers.

Alexandra David-Neel was a woman of remarkable courage. She recounts how the only way she could enter Lhasa, Tibet's forbidden (to foreigners) city was to sneak in dressed as a beggar carrying only a compass, money (for ransom in case she was kidnapped), and a gun. She was also known for her sound scientific thinking, and her opinions and observation carried weight in academic and scientific circles. Doctor A. D'Arsonval, a member of the French Academy of Sciences, The Academy of Medicine, professor at the College of France, and president of the Institute of General Psychology, said of Alexandra David-Néel:

> *This well-known and courageous explorer of Tibet unites in herself all the physical, moral and intellectual qualities that could be desired of one who is to observe and examine a subject of this kind.* [330]

So, when she described how she used the techniques taught to her by the Tibetan magicians to conjure up her own *tulpa*, it is not as easy to discard them as pure fantasy. In her case, she manifested a short, pudgy, jolly monk, as per her intentions. Perhaps even more interesting was that once it became visible to others, this tulpa began to have its own free will, a life of its own; the jolly, fat monk began to grow lean and taller and less jolly. It eventually became a major problem for her, and she had to spend 6 months "dissolving" it. As she states:

> *The fat, chubby-cheeked fellow grew leaner, his face assumed a vaguely mocking, sly, malignant look. He became more troublesome and bold. In brief, he escaped my control. I ought to have let the phenomenon follow its course, but the presence of that unwanted companion began to prove trying to my nerves; it turned into a 'day-nightmare.' Moreover, I was beginning to plan my journey to Lhasa and needed a quiet brain devoid of other preoccupations, so I decided to dissolve the phantom. I succeeded, but only after six months of hard struggle. My mind-creature was tenacious of life. There is nothing strange in the fact that I may have created my own hallucination. The interesting point is that in these cases of materialization, others see the thought-forms that have been created.*

In Jewish folklore, there is a similar concept called a *golem* (not the *gollum* from "Lord of the Rings", which is spelled differently). These are beings created from clay or mud and then brought to life. The most famous legend of a golem is the 16th century *Golem of Prague*. This massive golem was specifically created to help protect the oppressed Jews, but due to simple human error, the golem went berserk, destroyed the neighborhood, and was ultimately disabled and stored in the attic of a synagogue for hundreds of years until the Nazis bombed that synagogue in WWII. Some people believe it was not destroyed and is waiting to be returned to life.

Whether tulpas and golems exist or not is left to the reader. The point is that the belief that ideas can take on a life of their own is neither new nor unique.

Perhaps we shall see our modern versions of tulpas and golems soon, as that is where the research into what is essentially the collective consciousness of artificial intelligence, or *A.I. Swarms*, as they are called, [331, 332] , and early attempts to create artificial humans [333] appears to be heading. No doubt, one day, they too will prove to be "more troublesome and bold, escaping our control." Stanley Kubrick and Arthur

C. Clarke brilliantly captured this concept of a *digital tulpa* in 1968 when the heuristically programmed algorithmic computer, the HAL-9000, in the movie "*2001: A Space Odyssey*", calmly told its creators:

> *I'm sorry, Dave. I'm afraid I can't do that.*

13: PREDETERMINISM

Free will exists, but its options are limited

Synopsis: *The path of least resistance on many levels. Emerging paths. The creation and existence of paths. Chaos and order in archetypes. Various concepts of "work". Tholonic instantiation.*

Keywords: *paths, entropy, music, chaos, order, archetypes, work, energy*

Remember the explanation of how a lightning rod works? It simply creates a path of least resistance between 2 different states that seek balance, and, as energy always travels the path of least resistance, lightning will always seek the lightning rod over a brick chimney. We can say that the path of the lightning was predetermined by the laws of physics before the lightning event, just as we can say that the lightning only came into existence because such a path even existed in the 1st place. In other words, the instance of lightning is a consequence of the preexisting energy fields.

The same concept holds for the thologram in that there can be almost countless combinations of archetypes and, therefore, almost countless connections of tholons between the "beginning" and the "end". This implies that within the thologram exists every path of creation and/or growth that is possible *at that moment in time*, but the paths that will be traveled are those that represent the path of least resistance, and what we see as reality around us is a consequence of energy moving through those paths.

As new combinations emerge, new paths emerge, but for the most part, these paths will emerge from the "bottom" or end-points of the hierarchy, as these are the most unstable and dynamic, similar to the unstable borders of a fractal. Each tholon represents a "step" in the path. New paths are rarer as we move up the hierarchy as these higher-order tholons have achieved a stable state that is held in place by the induction of their parents and children and short of a radical change in energy, they will not change. The force of the energy that would be needed to affect a change is inversely proportional to their ancestors and proportional to their descendants. This is why reality "*is confined by rules that may be shockingly narrow*", to quote Charles S. Cockell from his book "*The Equations of Life: How Physics Shapes Evolution*" and suggests that form and life across the Universe may not vary as much as we might imagine.

An example of these new emerging paths would be the creation of a new element in the periodic chart. All elements past the element of uranium are man-made, so they are new creations, but they are also extremely unstable, unsustainable, and don't last very long. A new stable path, even a little way up from the "bottom," would dramatically alter reality.

Starting from the beginning, immediately upon the 1st awareness of a non-existent dot in the void of nothingness, A&I began self-replicating into smaller and smaller divisions. These divisions stop at some point where no sustainable patterns can be achieved, perhaps because the difference is too small, weak, or for another reason.

The depth of a tholon's scope can be described as the difference between 2 states, the delta of the duality of that scope, similar to the definition of voltage we saw above, which presumably gets smaller and smaller with each generation (but not necessarily).

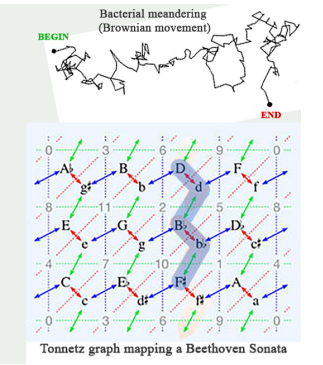
As the parents and children of a tholon change, so will that tholon adapt to these changes by adjusting its scope. In doing so, the thologram is *problem-solving* in real-time. More than that, this adaptation is heuristic, i.e., a manner based on experience. How? Because the (only successful) changes that have been made in the past resulted in changes to the entire thologram. The consequence of those changes define the context of each tholon's current condition.

The working hypothesis is that the thologram has a memory of everything that has ever happened to it that resulted in a successful change. This chain-of-records is continued with each tholon that is created. However, there can be many tholons occupying the same space because of the embedded nature of tholons, so if you reference a tholon at the "bottom" of the thologram, you are implicitly referencing every parent tholon in the chain of tholons back to the very 1st tholon. This suggests that any instance of a tholon is also an implicit reference to many tholons and the path or chain that connects them.

What this tells us is that each instance is a 3D perspective of a very multi-dimensional form of energy that describes one "path" from the first tholon to the tholon in question but which we 3D dwellers experience as past, present, and future (like the 3D ball passing through 2D space example previously).

Two strangers, Bob and Carol, bump into each other at the butcher shop. This interaction is the result of countless steps starting with the Big Bang, or whatever the 1st event was that kick-started the Universe. The path from the 1st moment of creation to the current instance that it took for Bob and his ancestors to arrive at this point and time we'll call path B, and the same for Carol we'll call path C. Path B, and path C already existed in the thologram, and Bob and Carol happen to be the current instance of the fields of these two paths that connected because it was the path of least resistance, for whatever reasons, like the two fields that connected to create lightning. There are effectively an infinite number of paths and their fields, but the point where Bob and Carol meet is the only point where the two fields, of which they are the current instances, connect. If reality itself is the memory store, anything that emerges from this meeting will inherit the "implicit information" of both paths that led to their meeting.

Every path that can be traveled by any instance already exists because the fields already exist. The path is the expression of the fields interacting. We tend to wander through this matrix of possibilities in a manner that appears aimless, similar to the manner bacteria wander about in their puddles of plasma. From the tholonic perspective, these paths are determined by various cooperative and competing tholonic fields.



Tonnetz graph mapping a Beethoven Sonata

Perhaps one of the best instances of this that is easily understood is music. Consider that a finite number of notes exist, but an almost infinite number of tunes can be written within those notes. If we mapped every combination of notes, the tune could be seen as a path on that map. This is more than just a thought experiment… it's an actual undertaking by music theorist Julian Hook, who described in his article "*Exploring Musical Space*" [334] how the harmonic path of a Beethoven sonata can be visualized on a *Tonnetz* graph (left)&hellip, a graph that happens to look just like a 2D tholon map. In this example, the notes act like the fields, and the playing of those notes represents energy moving through these fields, forming music, lightning, plants, rivers, neurons, and everything else.

Music also demonstrates how certain patterns can lay down the foundations upon which other patterns and expressions build. For example, there are many different scales, such as *pentatonic*, which has 5 notes per octave, or the *Western Major Scale*, with the classic 7 notes most Westerners are familiar with. Sound occurs when energy is applied to matter, and notes represent the *dots* that we have identified within that chaos of white noise through our power of reasoning. We form patterns and connect these dots in the sea of chaos that is all sound, and by doing so, we create "music". We describe white noise as all frequencies expressed at once, but it is equally accurate to describe white noise as every possible pattern of all possible notes being performed at once, similar to how incoherent white light is an infinite number of coherent frequencies and directions. This tells us that all possible forms of music, all songs, rhythms, beats, arrangements, etc., already exist within that white noise, and all we can do is discover them.

This discovering is not limited to humans, as we see this same thing in songbirds. Of course, believing this will depend on which church of science you attend.

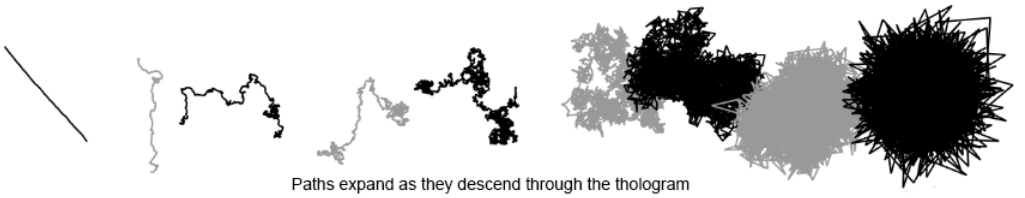
In 2012, *Science Magazine* published an article citing a report from the *Journal of Animal Behavior* titled *"Is birdsong music? Evaluating harmonic intervals in songs of a Neotropical songbird"* [335] that concluded that any musicality we might hear in a bird's song is nothing more than projection on the human's part. 2 years later, however, they published an article that cites a later study from the *Proceedings of the National Academy of Sciences*, titled *"Overtone-based pitch selection in hermit thrush song: Unexpected convergence with scale construction in human music"* [336], which concluded that birds most likely choose the notes they sing and that these notes are the same notes that we humans have also selected to create our musical scales.

The tholonic position is simply that some patterns are more stable and efficient than others, such as the harmonic series, so we would expect to see it in music, bird songs, fungal growth, orbits, and countless other contexts.

Even in the world of bacterial meandering, we see a pattern. Not surprisingly, it is the inverse of a Bell curve in that a group of bacteria released at the same time starts out relatively coherent and eventually disperses to incoherence. It's almost (or exactly) as if the instances of creations emerge from a tholon's Bell curve in a manner inverse to that Bell curve, like a kind of balancing factor, much like the way a positive charge will automatically create a pairing with a negative charge, or how the amount of water that falls to the Earth (rain) is equivalent to the amount of water that rises into the sky (evaporation) from the Earth. States of order create states of chaos, which create new states of order. It also appears that archetypes are always decreasing in entropy, becoming more ordered, while their instance always increases in entropy. This is possible because there is no *arrow of time*, only an *arrow of order* in the world of archetypes.

Key 79: Archetypes tend toward order, while instances tend toward chaos.

In the early generations of the thologram, the number of paths is limited, and with the additional generations, the number of paths increases. This movement may appear random, but not only does it disperse according to a Bell curve, but it also follows the same self-similar and fractal rules as the thologram [337].



Paths expand as they descend through the thologram

This is effectively predeterminism, although there are so many possible paths created by the unfolding, explicating, and instantiating of every possible combination of sustainable patterns that can establish a balance between differing fields that predeterminism doesn't practically apply. So, we may have free will, but only with regard to determining which predetermined path we follow, at least from the tholonic perspective.

If energy always travels the path of least resistance, then why doesn't everyone and everything follow only a single path? Wouldn't that suggest that energy doesn't always travel the path of least resistance? It would if everything was exactly the same, but thanks to chaos, the slightest change can have radical results. Still, chaos doesn't create randomness, so where does the initial random change come from?

There only needs to be a single random event, or random seed, at the beginning of creation, and the power laws and chaos will create new events from that single seed, which will appear and act as random. What that physical event was is unknown, but in the tholonic model, the 1st and only true random event, an event that has no reason, no cause, is the appearance of the 0-dimensional dot which came into existence via Awareness and Intention. Every event that results from that 1st event, which is all events, has some random seed built into it, but it also suggests that Awareness and

Intention, and perhaps *only* A&I, have the ability to create random events. The specifics of how this would work are unknown, but the point is that randomness is built into creation and existence.

But there is another concept to consider regarding paths of least resistance. As demonstrated in the effort expended listening to a lecture on "*Post-modern Fashion in Appalachia*" vs. digging a ditch, resistance can vary wildly. What is least resistant for me is not what is least resistance to a sociology professor teaching "Dr. Seuss and Y(our) World" (an actual class at, coincidentally, Appalachian State University). This resistance is not electrical, thermodynamic, or mechanical, nor is the psychic energy it is resisting, but this psychic energy is just as influential in deciding what path will be chosen. As everything is energy, and energy travels the path of least resistance in the process of balancing itself, whatever this psychic energy is, it must also be traveling the path of least resistance and attempting to balance itself.

Although a bit of a tangent, and undoubtedly worthy of more than a paragraph, it's worth stating here that the idea of reincarnation has a tholonic explanation, which goes something like the following:

What some people believe to be past-life experiences are collective memories associated with the path we happen to be instantiating, or traveling, if you will, and which we identify with mainly due to our ego's nature to relate these inherited and embedded memories (and everything else, apparently) to one's self. There will naturally be more instances (of people) in these well-worn paths of archetypes simply because these paths are the paths of lesser resistance. Hence, many individuals will share the same memories of this path, which explains why many believe they were some grand historical figure in a past life.

This is not an idea limited to reincarnation, as numerous patterns dominate and influence the ideas that make up our view of reality at different times. For this reason, reality, from atoms to ideas, also differs across time. Take the concept of an atom which is based on the patterns of reality we happen to be discovering at this point in our journey. At other times, this concept didn't exist or did so quite differently. Perhaps in the future, it may disappear altogether. There may come a time (or was a time) when what we see as atoms are seen as spirits, bits of intelligence, or 3D projections of a 248D magic crystal, or something we are incapable of imagining at this time. The laws that apply in the context of atoms, now and in the future, will also apply to "spirits" or bits of intelligence, or however we choose to see them, and these laws will also be understood within the context and scope of the time. Just in the last 90 years alone, the model of the electron has morphed from a type of "mist" (1905) to little orbiting particles (1911) to standing wave patterns (1924) to the probability fields of quantum mechanics that extend to the edge of an entangled Universe (1926).

While every tholon is unique, its instances will usually be very similar, as there are many instances for every archetype. Likewise, there is no reason why there couldn't be multiple near-identical instances of a tholon, and many reasons why there could be. This concept has been around for a long time in the form of *doppelgangers*, twin strangers, alter egos, and changelings, and has found a new home in concepts such as cloning and the multiverse. Metaphysics has a similar concept of a *soul family*, which are groups of souls that share much of the same "structure", metaphysical DNA, so to speak, as they are part of the same collective of an encompassing "soul". Naturally,

such concepts would appear as we see this concept manifest in nature, especially among living organisms; many leaves from one branch, many branches from one tree, and many trees from one root system. Modern science, with the discovery of DNA, only adds support to this concept.

Tholons are more than just archetypes of things. They are archetypes of ideas, contexts, situations, experiences, and concepts. As such, we should expect to see "clones" or "twins" of situations, contexts, experiences, etc. We do, and we tend to call them "coincidences". Here are some of the more popular or well-known stories of "coincidences" that, when viewed tholonically, might offer insight.[338]

Laura Buxton

"In June of 2001, a 10-year-old girl named Laura Buxton released a balloon with her name and address on it. That balloon floated 140 miles and landed in the back yard of a house where also lived a 10 year old girl named Laura Buxton. On the day of the meeting, the two girls wore essentially the same outfit — a pink sweater and jeans. The girls were the same height, which was unusual because they were both tall for their age. They both had brown hair and wore it in the same style. They both had three-year-old black Labrador Retrievers at home, as well as gray pet rabbits. They both had guinea pigs, which were the same color and even had the same orange markings on their hindquarters. It was almost as though these two Laura Buxtons were the same person".[339] On the right is a picture of the two Laura Buxtons, who are still friends today.

Here, there are two contextually separated instances of one tholonic path. What is fascinating about this is that the 2 instances of the same archetype would naturally have an existing connection, a tholonic resonance. The red balloon offered the most efficient manner through which these instances could make contact given their context. Why was there a "need" to make contact at all? Tholonically, they were already connected; it just took time for that connection to instantiate. We could also think of these 2 instances as 'entangled' as they both emerged from the same archetype. This connection, or entanglement, was instantiated via the red balloon that carried the address between the receiving side and the transmission side of this split instance.

King Umberto I's double

In Monza, Italy, King Umberto I went to a small restaurant for dinner, accompanied by his aide-de-camp, General Emilio Ponzia-Vaglia. When the owner took King Umberto's order, the King noticed that he and the restaurant owner were virtual doubles, in face and in build. Both men began discussing the striking resemblances between each other and found many more similarities.

- Both men were born on (March 14th (Pi-day), 1844.

- Both men had been born in the same town of Turin, Italy.
- Both men married a woman with the same name, Margherita.
- The restaurateur opened his restaurant the same day that King Umberto was crowned King of Italy.
- On 29th July 1900, King Umberto was informed that the restaurateur had died that day in a mysterious shooting accident. As he expressed his regret, an anarchist assassinated him in the crowd.

This looks like a single archetype that instantiated in different contexts, similar to the Buxton girls, albeit in more dramatically different contexts. This may also suggest that tholonic contexts are also archetypal, meaning there are "archetypal contexts" and "instantiated contexts".

Twin boys, twin lives

Twin Ohio boys were separated at birth and adopted by different families. Unknown to each other, both families named the boys James. Both James grew up not knowing the other, yet both sought law-enforcement training. Both had abilities in mechanical drawing and carpentry, and each had married women named Linda. Their sons were named James Alan and James Allan. The twin brothers also divorced their wives and married other women, both named Betty, and they both owned dogs named Toy. Forty years after their childhood separation, the two men were reunited. (Source: Reader's Digest, January 1980)

This is 2 instances of the same tholon and context at birth and in life, but it also suggests that other tholonic archetypes, such as those of the wives, the children, and even the dogs, were an integral part of the contextual instances.

Three strangers on a train

In the 1920s, 3 Englishman were traveling separately by train through Peru. At the time of their introduction, they were the only men in the railroad car. Their introductions were more surprising than they could have imagined. One man's last name was Bingham, and another man's last name was Powell. The remaining man announced that his last name was Bingham-Powell. None were related in any way. (Source: Mysteries of the Unexplained)

Here, these men, although having different lives, clearly shared some contextual details. Does this suggest that even our names can be instances of a pattern? I have some experience with this personally. Since childhood, I have had a strange and nostalgic fascination with El Paso, Texas, especially its Old West history. I had never been to El Paso prior to when I drove through the West Texas desert town in my 40s at around 4 AM in the morning. It was an ugly town, but I found it incredibly alluring for reasons I could not explain. Years later, I discovered that a well-known Old West lawman of El Paso and I shared the same name. I can't say if that is why I felt the way I did about El Paso, but there is no question that my name and El Paso share a strong tholonic bond, so some resonance would exist between these two concepts.

Richard Parker

Edgar Allan Poe wrote a story called “The Narrative of Arthur Gordon Pym”. This story was about 4 survivors of a shipwreck who were in an open boat for many days before they decided to kill and eat the cabin boy named Richard Parker. Some years later, in 1884, the *Mignonette*, a 52-foot English Yacht, was capsized by a wave as they traveled northwest of the Cape of Good Hope. The survivors found themselves together in an open boat for many days. Eventually, the 3 senior members of the crew killed and ate the cabin boy, whose name was Richard Parker.

Here, a pattern took form as both a story and an experience. Perhaps Poe was able to tune into certain patterns. Maybe that is what creativity or genius is; the ability to tap into patterns that have yet to become instantiated. p.s. The men served only 6 months in prison and were then released. They were the first men to ever serve time for cannibalism and murder on the high seas because it was considered a “custom of the sea”. See “Her Majesty The Queen v. Tom Dudley and Edwin Stephens”, High Court of Justice, Queen’s Bench Division, 1884.

A writer’s plum pudding

In 1805, French writer Émile Deschamps was treated to some plum pudding by the stranger Monsieur de Fortgibu. Ten years later, he encountered plum pudding on the menu of a Paris restaurant and wanted to order some, but the waiter told him the last dish had already been served to another customer, who turned out to be de Fortgibu. Many years later, in 1832, Émile Deschamps was at a diner and was once again offered plum pudding. He recalled the earlier incident and told his friends that only de Fortgibu was missing to complete the setting. In the same instant, the now senile de Fortgibu entered the room.

This seems to be a very specific, yet persistence, pattern that required plum pudding and only instantiated when Deschamps and de Fortgibu were near one another.

A novel that unsuspectingly described the spy next door

When Norman Mailer began his novel *Barbary Shore*, there was no plan to have a Russian spy as a character. As he worked on it, he introduced a Russian spy in the U.S. as a minor character. As the work progressed, the spy became the dominant character in the novel. After the novel was completed, the U.S. Immigration Service arrested a man who lived just one floor above Mailer in the same apartment building. He was Colonel Rudolf Abel, alleged to be the top Russian spy working in the U.S. at that time. (Source: Science Digest)

Here is an example of pattern instantiating while at the same time being perceived and recorded by a bystander, similar to the Poe story, but in real-time, and again, in close proximity. This also looks like an example of tholonic field induction.

A falling baby saved twice by the same man

In Detroit sometime in the 1930s, a young (if incredibly careless) mother must have been eternally grateful to a man named Joseph Figlock. As Figlock was walking down the street, the mother's baby fell from a high window onto Figlock. The baby's fall was broken, and both man and baby were unharmed. The following year, the very same baby fell from the same window onto the same Joseph Figlock as he was again passing beneath. And again, they both survived the event. (Source: Mysteries of the Unexplained)

If proximity is a factor, we have to wonder, would the baby have ever fallen if Figlock never walked down that street? Was the baby's falling a contextual instantiation of some expression resulting from the proximity of Joseph and the baby, similar to the red balloon of the Buxton girls?

A determined bullet

In 1883, Henry Ziegland broke off a relationship with his girlfriend, who, out of distress, committed suicide. The girl's brother was so enraged that he hunted down Ziegland and shot him. The brother, believing he had killed Ziegland, turned his gun on himself and took his own life. But Ziegland had not been killed. The bullet had only grazed his face and then lodged in a tree. Some years later, Ziegland decided to cut down the large tree, which still had the bullet in it. The task seemed so formidable that he decided to blow it up with a few sticks of dynamite. The explosion propelled the bullet into Zealand's head, killing him. (Source: Ripley's Believe It or Not!)

The pattern here is the bullet and the intention behind it. Intentions alone can be their own pattern. Here, it appears as though the archetype of the intention and the instance of the bullet formed a relationship with its own intention.

From one perspective, you could see all these stories as extremely unlikely coincidences. From a tholonic standpoint, each of these stories describes a particular path that was the most efficient manner for a stable pattern to instantiate. One very telling detail is the significance that proximity appears to play. This would be expected if strong tholonic field(s) were involved in these instances.

Realistically Speaking

The above accounts represent some of the more extreme and rare instances of "coincidences" that are neat and clear. In most cases, such coincidences tend to be far more comical, confusing, and messy, like so much of life. A more practical example that everyone can probably relate to is the following account that a reader shared after reading the above cases.

> *This personal anecdote seems related to this chapter: I had a "Jessie" thing in my earlier life—many of them accumulated. Only part of that was—I was married to Jessie (#1) (whose boss's name was Jessie) and had an affair with a man named Jessie (#2), who was born in the town of Nelson. He had a wife named*

> *Lynn, a son named Alexander, and a daughter named Anastasia. My best male friend (who later became my 2nd husband) was named Nelson. His wife's name was Jessie, and his girlfriend's name was Lynn. My middle name was Lynn. When I was expecting my 2nd child (not yet knowing the names of Jessie's (#2) children), I thought I might name a boy Alexander, or a daughter Anastasia. I always thought this was weird, and I didn't understand it. You've helped me understand it. (These are the things you don't put in fiction because they're TOO weird, and fiction is supposed to make sense).*

Life, Death, Afterlife

Every creation, including tholons, goes through the cycles of instantiation: inception, gestation, emergence, propagation, culmination, and dispersion. This is just one description that identifies 6 stages, or rather, the subjective and objective expressions of the trigram of *Negotiation/balance*, *Definition/limitation*, and *Contribution/form/integration*. There can be many others models.

When a tholon "disperses" itself, whether due to loss of energy, destruction, absorption, or any number of ways, its stable energy pattern can end. What then survives, and where does the energy go? The energy goes wherever it can go with the least resistance, similar to how heat dissipates. The context of this dissipation might be the parent tholon, but perhaps it could be a peer tholon. It could also stay right where it is if there are no immediately available paths of lesser resistance, not unlike a static charge that is held until it can be released. The various possibilities could easily describe different states that many commonly call the *oversoul*, or ghosts, spirits of the dead, poltergeists, and other types of disincarnates that describe something like an *implicit instance*, or an instance that does not have the structure, energy, or opportunity necessary to take form, like the ink dots in the glycerin example.

Aliens and UFOs

As long as we're talking about the afterlife, we might as well address the subject of aliens and UFOs. This will be very short because if the tholonic understanding that the Universe and everything in it are different expressions of intelligence, then asking, "is there intelligent life in the Universe?" would be like wondering if there is such a thing as water while swimming in the ocean. Aliens, UFOs, etc., are instances of archetypes, and their instantiations will wholly depend on the context and scope they are perceived in. Here, context includes cultural beliefs and the abilities of the perceiver. Is/was Earth visited by aliens, and if so, what role have they played in our story? From the tholonic perspective, asking such a question is valid if the answer brings us closer to a verifiably better understanding of reality. The tholonic question is, what are the tholons that exist beyond our perception of reality? How can/will they be perceived, and how will/do they affect our reality? Are there countless and unimaginable forms of life elsewhere the entirety of existence, and are any of these forms more evolved than we are? The most reasonable obvious answer is "probably".

The tholonic view is (to requote Richard Feynman):

> *It doesn't matter how beautiful your theory is. It doesn't matter how smart you are. If it doesn't agree with experiment, it's wrong.*

Direction of Intention

Here we return to the concept of *intention* which was skipped over previously by asking why the universe is not in a constant state of chaos, why changes result in order, growth and evolution, and not just chaos to chaos. New science has much to say about this and various books and papers have been written on this subject[340].

Key 38: The "intention" of energy is to balance itself, this all movement of energy is "intention".

At the particular point we are in the life cycle of the Universe, there is certainly support for the ideas that an ever increasing order is the obvious direction of growth and evolution. This is because we are still on the ascending side of the slope where low-entropy chaos form order. Is is therefore natural for us to believe that existence itself is a journey toward higher order, an unfolding or explication of implicit, embedded, encoded, predestined, hidden orders. This is basis of the concept behind *Intelligent Design*, and various concept of divine destiny, which presume that the creator of the Universe had a plan, or an personal intention at the moment of creation. This idea is an anthropomorphic version of the fact that the *intention* of energy is to balance itself, not because of a desire or choice, but because of the laws of nature.

However, at some point in the journey, the *intention* of existence will be sliding down the slope from order to high-entropy chaos, and if there are conscious being around when that happens, they will probably conclude that all of existence, god, and the purpose of reality is to destroy all forms of order.

The direction of intention points towards wherever the most efficient movement of energy can be found. In the cycle of existence, the intention of the first half of the cycle will be in creating order from low-entropy chaos, and in the last half of the cycle, it will be in creating high-entropy chaos from order.

At this point in the cycle, the *intention* of creation favors *constructive collaboration* slightly over *destructive resistance*. For what it's worth, our highly unscientific, unprovable, irrelevantly small sampling in the "Bless or Curse" experiment suggests that *constructive collaboration* has a 2.5% edge, at least among the sample group for that moment in time.

The human brain, cellular mechanics, and all life, in general, are wired to be both competitive[341] and cooperative[342] at the same time, which implies that this is, for now, the most effective manner for an living instance to express the intention of its tholonic.

Part IV

Supplementary info, appendixes, notes, arguments, analysis, examples, and miscellaneous.

Appendix A: About This Book

Technical information the reader may want to know

Writing Style

For those readers who are sticklers about writing style conventions in the U.S., I have deliberately chosen to place punctuation (that is not part of a quote) outside of quotes. The convention of placing punctuation inside the quotes was adopted due to the limitations of fixed-width fonts in the pre-digital age. The British convention has the punctuation outside of quotes, but that is because they use single quotes, not double quotes. To quote William Strunk and E. B. White, “Typographical usage dictates the comma be inside the marks, though logically it seems not to belong there”. I agree with the Canadian poet, typographer, and author Robert Bringhurst, who bravely stated that it “makes no *typographic* difference” if quotation marks “follow commas and periods or precede them”.

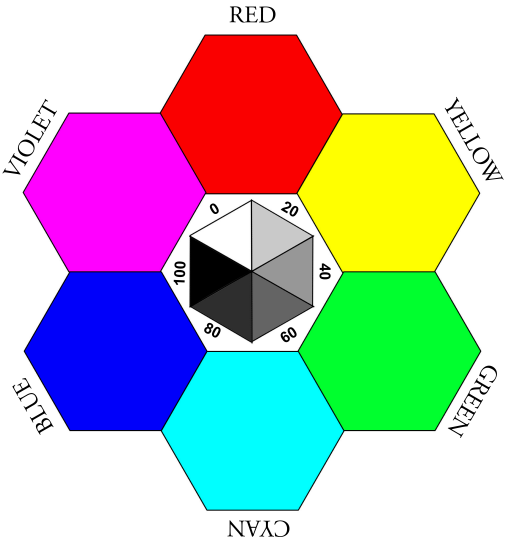
This book also follows periods with 2 spaces, not 1. The 2-space rule was also in place due to fixed-width fonts, but unlike the punctuation-quotes rules, it has fierce opposition, with both sides claiming victory. Even the American Psychological Association has gone from officially recommending 1 space, then recommending 1 *or* 2 spaces, then back to 2 spaces (in their 6th edition), then back to 1 space (7th edition). This does not inspire confidence in their craft. I will be using 2 spaces because it has been shown that using 2 spaces after a period increases text processing ability[343].

While it is customary to spell out numbers in a sentence, for the most part, numbers in a sentence will be shown as numerals when they refer to a quantity, e.g., “There is 1 apple” vs. “Alone with one’s thoughts”. This allows quantitative numerical values to be easily recognizable, increasing text processing ability. This style also avoids the inconsistent and differing rules of when it is proper to spell out numbers, such as; any number less the 10, 13, 100, always at the beginning of a sentence, never a date, day, time, decimals, money, in titles, percentage, etc., etc. The general rule in writing is “when in doubt, spell it out”, but there is no doubt with the rule “If it’s a unit of measure in any dimension (time, value, length, quantity, ratio, etc.), it’s a numeral”.

When it comes to the capitalization of the names of celestial objects, which is still a very unsettled debate, this book follows the recommendation of the American Physical Society (APS) and capitalizes all non-generic references, for example, “Our Universe, Sun, and Moon are an instance of many universes, suns, and moons”.

Low-Tech Issues

My apologies for the sometimes crude layout of the book in general. Once upon a time, I was a young typographer back in the days when the job often included the re-melting of lead “pigs” that were used to set the type using the Linotype machines of the day. That drudgery has been replaced with endlessly tweaking semi-compatible mark-up languages such as Markdown, LaTex, PDF, HTML, CSS, and JavaScript (I was much better at melting “pigs”).



One of the challenges in writing this book was getting color images to appear meaningful in black and white ebook readers. In some cases, it was not possible, especially considering various ebook readers use various schemes to deal with colors.

To that end, here is a simple color wheel showing how your e-reader treats at least the 6 basic colors. The center shows the 6 shades of white to black.

The sad and current state of ebook readers is that most do not support anything but the most basic formatting, and even *that* is often spotty, especially regarding block-quotes and lists, and even more so if the e-reader is older. Using color is discouraged for ebook publishers, but that is not possible in this book. Feel free to download the latest version in color PDF from https://tholonia.com.

If you are reading this on an ebook reader, the chances that it will look especially ugly are quite high. This is because many ebook reader manufacturers take it upon themselves to deliberately eliminate the layout the author has developed and replace it with their own generic (and, IMHO, hideous) one-size-fits-all format. The only upside to this that I can imagine is for the manufacturer, as it frees them from having to deal with more complex layouts. I find this practice offensive to the author and the reader, not to mention reinforcing the standards of banality. There are ways around this, but it involves downloading software and installing patches on the ebook reader.

Appendix C: Tholonic Math

The archetypes of form and function

Numbers

Numbers and archetypes

A number is an archetype. Numbers require energy to exist and are abstract expressions of energy as well. For these reasons, we can imagine numbers as a types of resource.

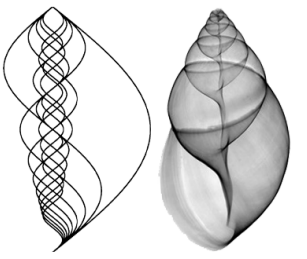
We don't naturally think about a number as an expression of energy, but that has more to do with what we have been trained to think about numbers. However, this perspective is compatible with both schools of thinking regarding numbers; the *Platonists* (*"numbers are non-physical, non-sensible things that exist in an objective realm beyond time and space"*) and *Nominalists* (*"numbers don't exist outside of abstract man-made concepts"*).

As concepts themselves are energetic, they also have stable and unstable patterns. The concept of *integers* is one such stable pattern discovered from the stable patterns in nature. From the tholonic perspective, it does not matter if the Platonist's or Nominalist's theories are correct; all that matters is that the concept of *integer* exists.

We start with 0, nothingness, which, as explained earlier, also creates the concept of somethingness, which we will call *unity*, or 1. When there exists only 0 and 1, the only possible instance of a value is 1. There are no other options. It is similar to entropy in that energy only moves in one direction, that which is the least resistant, most efficient, and results in a more balanced state. 0, of course, has no entropy at all. For energy to move beyond 1, there needs to be a new instance of a value, and as the only value that exists is 1, the only value other than 0 or 1 that can be instantiated is 1+1.

Now that we have 2, we can create 2 more numbers, 2+1 and 2+2, and they will be created in that order because 1, being *lower in entropy* than 2, will naturally offer less "resistance" than 2. As entropy always increases, so 1 must expand to 2. With 1 and 2, we now have 3 as well. We have created the numbers 0, 1, 2, and 3. These 4 numbers are the simplest, lowest entropy values necessary to define 3-dimensional space, and the simplest, lowest entropy form that can exist in that space is a tetrahedron. In this way, 0, 1, 2, and 3 relate to a tetrahedron and can be considered a numerical tetrahedron. With these 4 numbers, we can create the numbers 0 to 11.

One way to consider the progression of values from 0 to ∞ is to consider integers as the most stable pattern for an abstract form of energy that is represented as a value. We see an example of this in how every level of energy in an atom has its own specific and stable *orbital* (which is a bad name, as they are more like clouds of various shapes) around the nucleus. If the atom absorbs energy, the orbitals change shape, and if energy is lost, such as when a photon is released, the shape reverts back to its lower energy shape.



Harmonic Series of wavelengths

Seashell (Bullina Virgo)

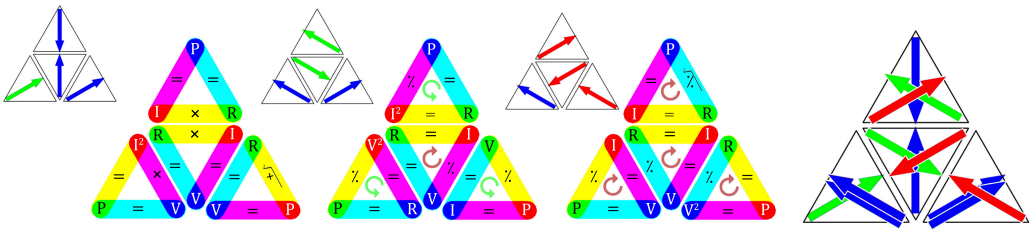
If we think about numbers as energy, and we accept the basic law that says energy can not be created or destroyed, then we can imagine the number 1 as 1 *unit* of energy where *unit* is defined as the *unity* of all energy. The number 2 is then 2 units

of energy, where both units equal 1, which is the same as each unit having $\frac{1}{2}$ energy. If we continue this, we have what is called the *harmonic series* of $\frac{1}{2}\frac{1}{3}\frac{1}{4}\frac{1}{5}\frac{1}{6}\frac{1}{7}\frac{1}{8}\ldots$ The harmonic series is a fundamental pattern in nature and the basis of music, which adds some context to the Pythagorean concept that "Physical matter is music solidified", or the Sanskrit *Nada Brahma*, "Existence is sound" (literally "god sound") or the legends of Native Americans, Judeo-Christians, Hindu cosmology, Egyptian, Aboriginals, Mayans, Norse, and many other cultures that have a story of sound shattering the void of nothingness at the moment of creation.

The harmonic series $\frac{1}{1}\frac{1}{2}\frac{1}{3}\frac{1}{4}$ rather than 1,2,3,4, (or what could also accurately be written as $\frac{1}{1}\frac{2}{1}\frac{3}{1}\frac{4}{1}$), represent an *internal expansion* of energy which describes natural patterns of energy that are perfectly represented with the concept of integers.

Key 80: Numbers represent energy and energy distribution.

Within the tholons are numerous relationships, and some of these relationships can be visually mapped to the 2D tholon map. For example, we could map the 12 formulas of Ohm's law to get the following:



This shows the 4 trigrams that make up a tholon, however, depending on the perspective of view of the tholon, the formulas will be different. There are many ways to view this mapping, but this is perhaps the simplest. Besides the basic 12 formulas, we also see that the trigrams have two "directions". One direction (the inner circle) is the direction of the formula, but this only applies where division is involved because $3 \times 2 = 2 \times 3$ but $\frac{2}{3} \neq \frac{3}{2}$. The other direction is an arrow that starts at the initiating value, the point of the N-source, and terminates at the child N-source.

For example, using *P=I×R*, we can see how the mapping assigns *P* as the blue *N-source*, *R* as the green dot of *Definition*, and *I* as the red dot of *Contribution*. This then creates a yellow (additive color of red and green) spectrum between *I* and *R*, which in the case of these formulas, is where the math operators of ×, ÷, √ and the function = exist. This yellow spectrum is that of *Cooperation or Conflict*, so it makes sense that it would also be where we you find × and ÷, and suggests that, in this case at least, cooperation is literally twice as efficient as division, given that the relationships in multiplication-based trigram works in both directions.

You will notice that there are 12 yellow spectrums. These are the only the locations capable of creating a new child N-source, Of those 12, half are the function "=", and half are operators. Off those 6 operators, 3 are *constructive* (×), 2 are *destructive* (÷),

and 1 is *reductive* (√, which is a special case of *destructive*). If we look at the yellow spectrum of only the trigrams where *V* is the blue N-source, as this is the archetype, we see that each of the 3 sets, or each side, always has a pair of function and a single instance of another.

= × × Side 1, Side of *Contribution* as multiplication

÷ = ÷ Side 2: side of *Definition* as division.

÷ = = Side 3: side of *Negotiation* as equalization.

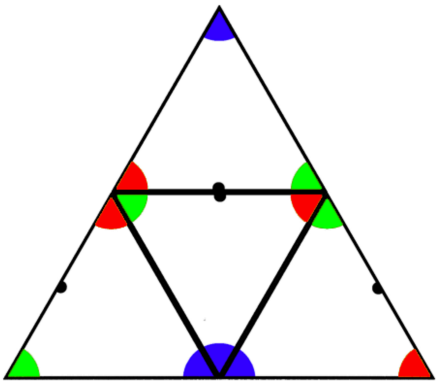
This beautifully shows how the primal attributes of *Negotiation*, *Definition*, and *Contribution* continue to reappear in every child and instance. In this case, we can see N, D, and C attributes within each N, D, and C as $\mathbf{C}_{\mathrm{NCC}}$, $\mathbf{D}_{\mathrm{DND}}$, $\mathbf{N}_{\mathrm{DNN}}$. Notice how × and ÷ never share a side, which we would expect to see given that they can only interact via =.

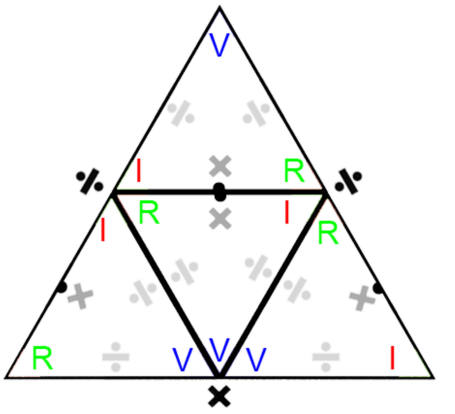
Looking at all the functions of a side, we see that we have 3 multiplications and 6 divides, which makes sense when you consider that multiplication works the same in both directions, so we need twice as many divisions to represent with division what multiplication can represent with 3.

New Data?

Applying Ohm's law to the tetrahedron shows some new relationships. Readers who enjoy numbers may find this next (short) section interesting.

We can satisfy all 12 formulas of Ohm's law as they appear on a tetrahedron, but we can also find some new data now which may appear as useless, or may be meaningful if we know how to use it, as we have claimed that *"There is no useless data, only data we have yet to understand how to use"* and *"All data is valid"*.

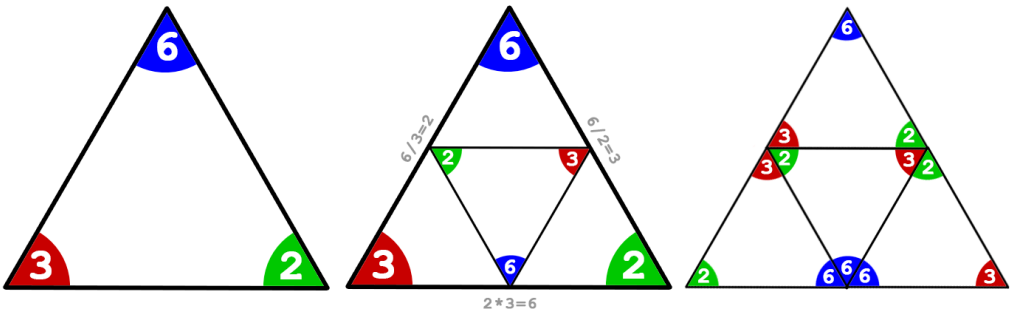




Previously (and in the left-most image above) we saw how the contribution of red divides the green on the right side but constrains the green on the left side . Can we apply these same concepts to other scopes, such as electricity? Does current (*I*) "divide" resistance (*R*) and is resistance (*R*) "constrained" by current (*I*)? Yes, but first we have to recognize that while "constrain" and "divide" have different meanings in their usual context, they have the same mathematical meaning. To describe the function $\frac{X}{Y}$ as *X* being *constrained* by *Y*, because *X* is being *defined* by, or measured by *Y*, is not inaccurate, as *X* is indeed being "kept within certain limits" in as far has how it is being measured. We can then say "resistance is defined by current" and "current is limited by resistance", both of which are technically correct statements.

In the right-most image above we have the 2D tetrahedron map with only *V*, *I*, and *R* values mapped to each trigram, along with the operators (÷, ×). The gray operators are associated with the inner trigrams, and the black operators are associated with the outer trigram.

Ohm's law states that $\frac{V}{R} = I$, so in the image above, all lines that connect *V* to *R* are assigned the ÷ function. The same goes for $\frac{V}{I} = R$ and $I \times R = V$. Note how only N-sources have the functions of ×.



Let's apply values to these points to make it clearer. Above is a tholon map where *R=2*, *I=3*, *V=6* (and the implied *P=18*). These numbers satisfy the formulas of Ohm's law as you can see in the image above. These are not arbitrary numbers. They are the smallest numbers that represent the properties of each point, mathematically speaking. Why do we not start with the number 1 then? Because the properties of 1 are the antithesis of creation. 1 represents perfect unity and balance, whereas every number greater that 1 represents separation and imbalance. For example, if we applied the values of 1 to *I* and *R*, then the values of *V* and *P* will also equal 1.

> *Every positive integer greater than one can be written uniquely as a product of primes* ***~ Euclid, 4th century B.C. "The Fundamental Theorem of Arithmetic"***

The number 1 is unlike every other number and stands in a class all by itself:

- It a composite number, not is it a prime number, however, it used to be considered a prime number and not a prime number. Even
- Any number multiplied by 1 remains that number.
- 1 is its own factorial.

- 1 is its own square and square root, its own cube and cube root, etc.
- 1 is the result of the empty product, as any number multiplied by one is itself.

In fact, from the philosophical perspective of the Neoplatonists, the number 1 is not even considered a number in the traditional sense, but rather the *source* of all numbers.

So, why not start counting with 2 rather than 6? Because we assume that the children of N, when recombined, must equal N.

We can test these numbers by applying the formulas of Newton's 2nd and see that the bases of the trigrams apply *multiplication*, and the sides apply *division*, and consequently create perfect inverted replicas of themselves in the children.

There are some interesting relationships and values below. I can't tell you what they mean or represent, but it would be irrational to assume they have no significance without knowing anything more about them. Everything that leads up to these new values is quite reasonable and provable. It is just a matter of discovering where these new values and formulas apply. To explain these new values here would border on sadistic given what the reader has had to suffer through already, and as it qualifies as a book unto itself. However, there are just a couple I would like to share.

If we look at *current* (*I*, red, 3) "dividing" *resistance* (*R*, green, 2), on the right , and apply the operator of division associated with the 6-3 vector, or side, we have $2^2 \div 3$, which is $1\frac{1}{3}$ (which we'll call R_i). On the left we have *resistance* (*R*) *constrained* by *current* (*I*) , which is $3^2 \div 2$, which is $4\frac{1}{2}$ (which we'll call I_r). Neither number *seems* particularly significant, but if we multiply these numbers together, which we would because they are connected via the "base" of the trigram, the 3-2 vector, which has the operator of ×, we get $R_i \times I_r = 6$, which is the value for *V*, so Ohm's law has not been broken. Using this same reasoning we can apply this to the three 6s, but as they are on a vector of multiplication, we would say 6^3, which yields 216 (which we'll call V_3).

We now have new properties of R_i, I_r, V_3. We also know that $R_i \times I_r = V$. This means we can also say $\frac{V}{R_i} = I_r$ and $\frac{V}{I_r} = R_i$, all in accordance to Ohm's law. We can also calculate a new value for *P* as $V \times I_r = P$, but this gives us the value 27, which is a different value from $P=18$, so we will call this P_1. Let's test these values by applying the other formulas and see if we get the correct results. We can apply the formula $I_r^2 \times R_i = P_1$ where we'd expect P_1 to equal 27, and it does. Likewise $\frac{P_1}{I_r} = V$.

We have exposed at least 4 new values within the tholon map. Now all we have to do is find out what they mean and where they are applied in the real world. here are all the values listed.

- $R = 2$
- $I = 3$

- $V = 6$
- $P = 18$
- $R_i = 1\frac{1}{3}$
- $I_r = 4.5$
- $V_3 = 216$
- $P_1 = 27$

Regarding V_3, 216, this is a fascinating number that has a history that goes back to at least Plato, because we know (generally accepted by experts) that 216 is called *Plato's Number* and was described to Plato by Socrates who said (when explaining how to properly breed humans):

> *For the number of the human creature is the first in which root and square multiplications (comprising three dimensions and four limits) of basic numbers which make like and unlike, and which increase and decrease, produce a final result in completely commensurate terms.*

(The word "cubed" was not in use in those days, but 216 is the first (smallest) cube which is the sum of three cubes. It also makes more sense how this might apply to human breeding when you know that back in those days, odd numbers were considered male and even numbers were considered female. Math class back then must have been a lot more interesting.)

Plato elaborated on this in his "Republic":

> *Now for divine begettings there is a period comprehended by a perfect number, and for mortal by the first in which augmentations dominating and dominated when they have attained to three distances and four limits of the assimilating and the dissimilating, the waxing and the waning, render all things conversable and commensurable with one another, whereof a basal four-thirds wedded to the pempad yields two harmonies at the third augmentation, the one the product of equal factors taken one hundred times, the other of equal length one way but oblong,-one dimension of a hundred numbers determined by the rational diameters of the pempad lacking one in each case, or of the irrational lacking two; the other dimension of a hundred cubes of the triad. And this entire geometrical number is determinative of this thing, of better and inferior births.*

The above has been interpreted to mean 6^3, which Plato alludes to elsewhere, as 6 (considered the number of marriage back then) is the product of female (2) and male (3), and $2^3 \times 3^3 = 216$. While 216 is the most accepted answer, great thinkers spanning over 2,000 years, such as Aristotle, Proclus, Marsilio Ficino, Gerolamo Cardano, Eduard Zeller, Friedrich Schleiermacher, Paul Tannery, Friedrich Hultsch, and more, have all tried to decipher Plato's enigmatic text. 216's fame may even go back as far as Pythagoras, as it is the sum of cubes of the *Pythagorean triple* (3,4,5, hence $3^3 + 4^3 + 5^3$), or even Ancient Babylon. [344]

Later in history, this pedigree number fell slightly into infamy when John the Apostle declared in Revelations that 666 was the number of the Beast (the beast that comes out of the sea, not the one that comes out of the abyss of the Earth), but also referenced this this number as the the number of man. 216 might have escaped scot-free if John had not specifically said that the number 666 was to be *calculated* (or *counted* depending on translation) to learn its true number.

> *Here is a call for wisdom: Let the one who has insight calculate the number of the beast, for it is the number of a man (ed: or "humanities number"), and that number is 666 .* ***~John, Revelations 13:18 (NIV)***

Mathematicians even classify any prime number that contains the sequence 666 as Belphegor's Primes, named after one of the seven princes of Hell who helps people make discoveries and seduces them in to thinking they will be become rich as a result. Believe it or not, treasure hunting with demons was a very popular career choice until until the Industrial Age.

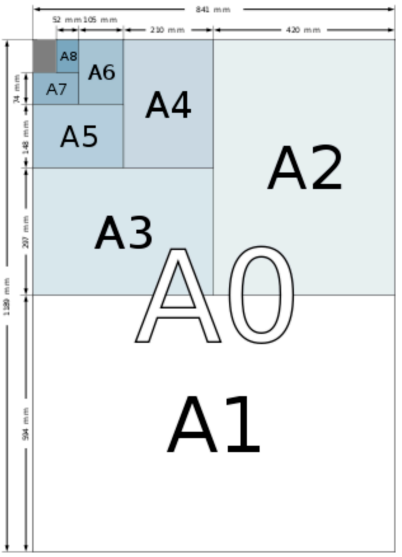
Because 216 = 6×6×6, it gained a dubious reputation by association with the Beast of Armageddon and started popping up in some strange places, thanks to humanities generally suspicious nature and love of doom. Fans of the arcane ignore the most likely suggestion that John may have been telling to reader to *add* the numbers together, because in the original Greek it was penned as 600+60+6, and "Six hundred threescore and six" in the most popular King James Bible. However, the odd coincidence that John's number of man (666), which needed to be "calculated", has a strong relationship with Socrates' "number of the human creature" being 6×6×6=216, which also needed to be calculated, is curious… even more curious is why these old timer's preferred to shroud their message in incomprehensible riddles rather than just tell us the damn number! Ug… philosophers. Regardless, 216's clout in the religious, mystical, and tin-foil communities holds up today. Just do an Internet search for "216" to see for yourself. Coincidentally, 216 × 10 happens to be the years the procession of the equinox moves through each of the 12 constellations… just sayin'.

The above example is based on only 1 of the 3 sides of a 1st generation tholon, and there are countless generations!

Squares and Roots

What is the significance of a square or square root? We know what it means mathematically, but how would that meaning be understood in a different context, such as society or law? The challenge with applying one relationship from one context to another is that without well-understood metrics, attributing foreign attributes to a relationship runs the risk of being very subjective, biased, and filtered through a cultural or moral lens that itself may be very biased. This is the reasoning behind many beliefs and superstitions. Nevertheless, we will try our best to avoid those pitfalls.

If you measure the long end of any A or B series piece of paper, such as the standard A4 size of paper, and divide that length by the short edge, you get the square root of 2. This is not a coincidence, but rather the very clever work of the Germans in 1922. The reason for this is so that a piece of paper of the dimensions $\frac{height}{width} = \sqrt{2}$, when folded in half (along the long edge), will remain $\frac{height}{width} = \sqrt{2}$. So, no matter how many times you evenly fold it, it will always remain the same relative size. This can only occur when the ratio is $\sqrt{2}$, making $\sqrt{2}$ a very self-similar or fractal concept.



The number 2 is especially unique in the way it is the only number where 2^2 = 2×2 = 2+2 = 4. No other number has the same value when squared, added or multiplied (except 0). Tholonically, a single point is nothing but a concept that has no dimension or form, but 2 points is the first instance of a duality and dimension, making it the most fundamental number of creation, or the transition from concept to form, so we would expect to see some property of self-similarity given that self-similarity is a fundamental property of existence. Perhaps that is why the number 2 is not only the first prime number, but the only even prime number as well. It may also be the only number that inspired a murder (allegedly). We already told the story of Hippasus, but what wasn't told was that along with his other mathematical crimes, he broke the sacred belief that all numbers must be expressible as fractions by proving that $\sqrt{2}$ was an irrational number. His discovery was declared "Fake News" and he was promptly dumped at sea (or abandoned on a deserted island).

In *Chapter 4: Laws*, we showed how $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} + \ldots = \frac{\pi}{4}$, but if we use all numbers rather than just prime numbers, we get a very different answer that adds to the significance of the number 2:

$$1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} - \frac{1}{6} + \ldots = ln(2) = \ 0.69314718056$$

In other words, the sum of 1 divided by all odd numbers (which is ∞) minus the sum of 1 divided by all even numbers (which is ∞) equals the natural Log of 2.

We also see the significance of 2 in the Riemann Zeta Function (which we explain and look at in *Appendix F, "An Unexpected Pattern"*: $\zeta(2)=\frac{\pi^2}{6}$ and $\zeta(2^{-1})=0$, or $\zeta(\frac{1}{2}) = 0$.

$\sqrt{2}$ is also the basis of the Silver Ratio. This is a less famous *Metallic Ratios*, which include gold, silver, bronze, copper, etc. While the Golden Ratio's mean is between 1 and 2 (1.618), the Silver Ratio's mean is between 2 and 3 (2.414), the Bronze Ratio between 3 and 4, and so on. Here are all the metal ratios:

Name	Equation	Factorial/Exponential Eq.	Factorial Equations	Value
Platinum	$(0 + \sqrt{4}) / 2$	$(0 + \sqrt{2^2}) / 2$	$(0 + \sqrt{2 \times 2}) / 2$	1
Golden	$(1 + \sqrt{5}) / 2$	$(1 + \sqrt{5}) / 2$	$(1 + \sqrt{5}) / 2$	1.618 0339 8874
Silver	$(2 + \sqrt{8}) / 2$	$(2 + \sqrt{2^3}) / 2$	$(2 + \sqrt{2 \times 2 \times 2}) / 2$	2.414 2135 6237
Bronze	$(3 + \sqrt{13}) / 2$	$(3 + \sqrt{13}) / 2$	$(3 + \sqrt{13}) / 2$	3.302 7756 3773
Copper	$(4 + \sqrt{20}) / 2$	$(4 + \sqrt{2^2 \times 5^1}) / 2$	$(4 + \sqrt{2 \times 2 \times 5}) / 2$	4.236 0679 7749
Nickel	$(5 + \sqrt{29}) / 2$	$(5 + \sqrt{29}) / 2$	$(5 + \sqrt{29}) / 2$	5.192 5824 0356
Aluminum	$(6 + \sqrt{40}) / 2$	$(6 + \sqrt{2^3 \times 5^1}) / 2$	$(6 + \sqrt{2 \times 2 \times 2 \times 5}) / 2$	6.162 2776 6016
Iron	$(7 + \sqrt{53}) / 2$	$(7 + \sqrt{53}) / 2$	$(7 + \sqrt{53}) / 2$	7.140 0549 4464
Tin	$(8 + \sqrt{68}) / 2$	$(8 + \sqrt{2^2 \times 17^1}) / 2$	$(8 + \sqrt{2 \times 2 \times 17}) / 2$	8.123 1056 2561
Lead	$(9 + \sqrt{85}) / 2$	$(9 + \sqrt{5^1 \times 17^1}) / 2$	$(9 + \sqrt{5 \times 17}) / 2$	9.109 7722 2864

The Golden Ratio is often credited for Silver Ratio accomplishments, such as the spiral of the Milky Way, facial proportions, architecture (especially in Japan), bird flight patterns, and more. Notice how the Silver Ratio is the only ratio (other than 1:1) that can be determined by only using the number 2.

Here are some thoughts as to how squares and square roots might apply to non-math contexts.

When we square something, the units-of-measure and the unit-count are the same. For example, 6^2 , *or* 6×6, says we have a quantity of 6 counts of a unit-of-measure that equals 6. The thing we are measuring, and the units-of-measure are the same. We are using 6 as an objective unit-of-measure to measure something that is essentially subjective.

Why is it subjective? Because when we say $a \times b$, we are implicitly saying *concept* × *count*. These concepts are archetypes, such as “apple”, “cost”, “voltage”, ”mile”, etc., which only exist within the context of the intelligences that created them. They are a collectively created and accepted archetypes that have no meaning outside of the context they exist within. An archetype does not exist in the material world, but *instances* of archetypes *only* exist in the materials world. In this way, archetypes and concepts are subjective as they only exist in the mind of the conceiver.

We can see this clearly if we look at the history of any concept based on material existence. For example, the concept of “apple” once referred to bananas (14th c.), and generically referred to all fruits, including nuts (17th c.).

Another example is the “mile”. The Romans, who invented the mile as 1,000 paces, knew that a mile was much shorter on rainy days over harsh terrain that is was on dry, flat fields. As the concept of the “mile” was adopted around the world, each culture adapted its definition, resulting in wildly different definitions. The Hungarian Mile example, was 8.9374 km! It wasn’t until 1959, over 2,000 years after the concept was created, that the mile was internationally settled to be 1.609344 km. Even the metric system is susceptible to contextual vagaries as it is based on the naturally observable data, which is contextual to humans on Earth. It’s worth nothing that the original concept of the modern metric systems was created simultaneously, by a French Roman Catholic Abbot, Gabriel Mouton, in 1670, who proposed using the Earth’s circumference as the basis of measure, and an Anglican clergyman, John Wilkins, who, in 1668, proposed using the length of a swinging pendulum with a half-beat of 1 second. Even

though Wilkins' book was published 2 years before Mouton's, he specifically criticizes the idea of using Earth's circumference as a standard, suggesting Mouton introduced his idea prior to his publication.

As for count, this is a strictly abstract mathematical concept that has no material existence, therefor no instantiation. Regardless of the context, 2 apples, 2 miles, 2 dimensions, 2 galaxies, etc., 2 retains the exact same meaning. However, things get fuzzy in extreme contexts, such as distance and time related to things moving at or near the speed of light but even then, the limitations is because of the thing, not the concept of 2.

For these reasons, we say that archetypes derived from instances, such as "apple" and "mile", are subjective, and instances that are derived from archetypes, such as numbers, are objective. However, *objective* and *subjective* are like any polarity; everything exists on the spectrum between these poles, and nothing actually exists as a pure state of either.

So, when we say $a \times b$, or *concept* × *count*, we are saying *subjective* × *objective*.

This may make sense when we say *apple* × *2 = 2 apples*, but what of we say *current* × *resistance* = *voltage*, or $I \times R = V$? Obviously, both I and R are subjective, collectively agreed upon measures. Wouldn't this be like saying *apples* × *oranges*? No, because *apples* and *oranges* are defined as the fruits of specific types of plant, while *current (I)* is already the results of numerous functions and operators, such as $\oint \vec{B} \cdot \vec{ds} = \mu_0 i + \frac{1}{c^2} \frac{\partial}{\partial t} \int \vec{E} \cdot d\vec{A}$, and the same is true for *resistance (R)* and *voltage (V)*. *Apple* and *orange* as concepts can't be reduced any further and remain *apple* or *orange*. When we do break down apple into its components, its *partons*, we find ourselves in the world of biology and geneticists, which have their own non-apple centric concepts, and apple is just a particular collection of 57,000 genes (twice that of humans!). In the same manner, we could reduce the macroscopic concepts of current, voltage or resistance to their microscopic components, but then we and up in the world of quantum physics, chemistry, etc.

This *subjective/objective* duality is effectively the same as the *quantitative/qualitative* duality. Here are those definitions again:

- **Quantitative** data can be counted, measured, and expressed using numbers. Quantitative data has an objective agreed upon value.
- **Qualitative** data that is descriptive and conceptual. Qualitative data can be categorized based on traits and characteristics.

On course, when we are speaking metaphorically, we are referring to the qualitative properties of math, not the quantitative, so none of these claims apply to math that can be done on a calculator (probably).

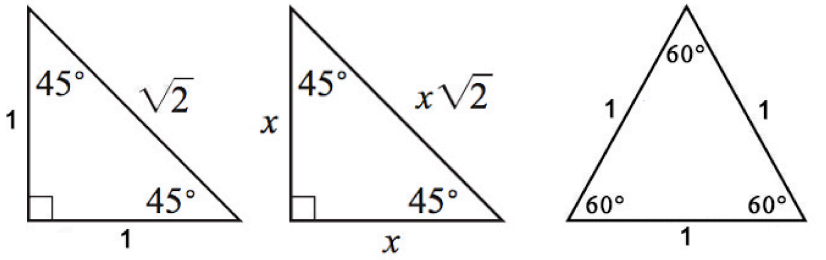
However, this metaphorical relationship appears in real-world instances, such as the relationship between gravity and consciousness. For example, in an earlier section we showed how the gravitational field g was a product of $G \times M_1 \times M_2$ where:

> *G = universal gravitational constant. M_1 = mass of the observing physical system (the observer). M_2 = mass of the observed physical system (the observed).*

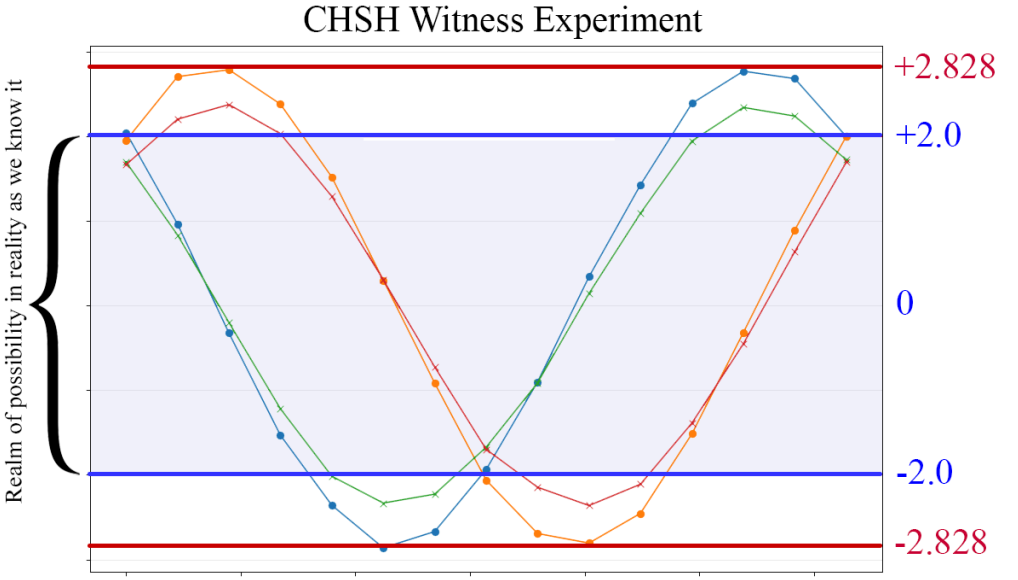
These definitions are verbatim from the research paper, and depend on the very same concepts of *subjective/objective* to describe the most fundamental force in reality.

Bringing this back to squares and square roots, squaring a number is metaphorically equivalent to something using its own properties to evaluate its own existence, not unlike the 1st dot that became aware of itself through the 2nd dot, creating the 2 states of objective and subjective.

Can we say that when something is squared, it is the objective measure of a subjective existence? Can we see these two conditions, subjective and objective, as 2 dimensions of something's existence? We know that 2 dimensions defines an area, and we also know that when two 1-dimensional (lines) are at their two most contrasting position (90°) they automatically define a 3rd dimension that is a multiple of $\sqrt{2}$.

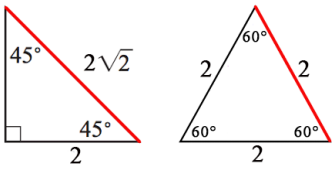


We can see a fascinating example of this if we look back to *Chapter 7.5 The Thologram* and revisit the CHSH experiment which shows that $\frac{2\sqrt{2}}{2}$ is the difference between relativistic and quantum realities.



The relevant part is how, when looking as the diagram of right angles and equilateral trigrams above, we see that in the RA trigram, which represents the maximum separation of the lines, we always have a connecting like (hypotenuse) that is a multiple of $\sqrt{2}$, but in the equilateral trigram, where all lines are equally distributed, all lines are equal.

Does this suggests that the quantum model is related to a RA triangle with sides of length 2, and the relativistic model is related to an equilateral triangle of with sides of length 2? Mathematically, they do seem related, as $\frac{quantum-probabilities}{relative-probabilities}$ and $\frac{hypotenuse}{side-length}$ both have a $\frac{n\sqrt{2}}{n}$ relationship.



From the ancient Greeks to modern philosophers, geometry and math has been fundamental in describing and understanding the world not just from a technical perspective, but even a moral, ethical, legal and social perspective. What follows is similar in that it uses math and geometry to support a philosophical premise. It needs to be stressed, again, that this exploration is not intended to shed new light on math or geometry, but rather, uses math and geometry as guideposts of reason. With that said, here is another view of the extra-mathematical significance of the number 2.

Tholonically, 2 is the result when the 1st instance of 1 created a new instance of 1 and is equivalent to 1+1. However, the resulting refers to the total number of 1s, not the components of a singular 1. The components of 1 is just 1, as 1^2=1, but the components of 2 are the pair of values that equal $\sqrt{2}$ (1.414). Here, we have multiple true statements that are different yet have the same result:

- *1+1=2*. This is how 2 came into existence. The *objective* instance of 2.
- 1.414^2 = 2. This is how 2 defines itself, like a type of numerical DNA. This is the *subjective* instance of 2 which has *qualitative* or *subjective* value of 1.414 that is measured by its *quantitative* or *objective* value of 1.414 is also 2.

This is another example of the fractal nature of numbers.

What is the reasoning behind this claim? We can say that the *original* source of 2 is *1+1* because we can only know the square root of 2 *after* we have created 2, so *1 + 1 = 2 =* $\sqrt{2}^2$, in that order.

The difference between 1 and 1.414 is the difference between creating something (1+1) and the creation itself (1.414^2), or perhaps the difference between the objective, or the quantitative and the qualitative. And what is that difference? It appears to be 0.414 because *1.414-1=0.414*, which also happens to be the inverse of the Silver ratio, $\frac{1}{2.414} = 0.414$.

What does 0.414 represent then? If *1+1* created 2, and 1.414^2 describes what was created, can we say that 0.414 is the difference between the *creator* and the *created*? Let's go with that for now and see if it holds up.

What *is* the difference between *creator* (1) and *created* ($\sqrt{2}$)? Is it similar to the difference between parent and child? man and god? flower and seed? Tholonically speaking, there are 2 types of tholons, that which can create new tholons, and that which cannot. When a tholon cannot create, it is the end of the line for that form of expression. The difference between *creator* and *created* is simply *creation*, which is an act on *intention*. Creators create, creations cannot create, that is, not until they become a creator, if they can. This suggests that measuring the number 2 by *creation* would tell us about the its ability, or perhaps potential, to *create*.

How would we define the concept of 2 by the difference between *creator* and *created*? We can measure 2 by the unit of *creation*, or put it another way, $\frac{2}{0.414}$.

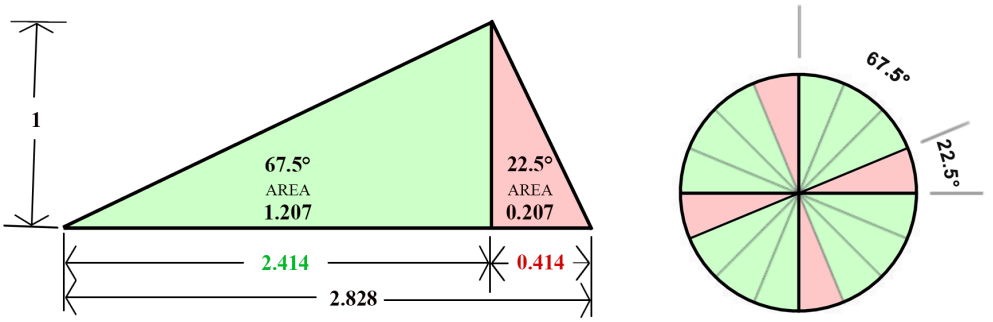
What is $\frac{2}{0.414}$? It is 4.828. And what is 4.828?

- *Silver Ratio* × *2*.
- $2 + 2\sqrt{2}$. This is interesting as 2 and $2\sqrt{2}$ were the limits of relativistic and quantum probability in the previous test.
- The area of an octagon (having sides of length 1). Likewise, $s = \sqrt{\frac{A}{4.828}}$ can be used to approximate the side length s of a regular octagon with area A. In addition, an octagon with an area of $\frac{2}{0.414}$ has a perimeter length of 2^3, or 8. The octagon is of special interest as it is a 2D version of the 3D octahedron, the shape of nothingness. Related this this, the surface area of an octahedron is $\sqrt{2}$ when edge length = 0.414.
- The *tangent* of $\frac{1}{2^{2^2}}$ of 3 circles (67.5° out of 720°) plus the *cotangent* if $\frac{1}{2^{2^2}}$ of a 1 circle (22.5° out of 360°). This is interesting as it shows a relationship between 1 and 3. In this case,, with circles, but we see this in the tholon as well.

...and a bunch of other stuff as well, for example, see image below. In that image, notice how, when the height = 1, the red area is $\frac{0.414}{2}$, the green area is $1 + \frac{0.414}{2}$, and the base length is $\frac{2}{0.414} - 2 = 4.828 - 2 = 2\sqrt{2} = 2.828$.

This is also interesting because a circle can be easily divided into 4 identical quadrants. All 4 quadrant are the *partons* to a circles *holon*, but the archetype of a quadrant is itself a *holon* and it, too, has *partons*. These *partons* can be 4 equal divisions of 22.5°, or 2 partons only, one of 22.5° and one of 67.5° (or there can be 4 *and* 2 at the same time). Why do we say this? Because the patterns these *partons* create are based on the most stable patterns of creations, and specifically, 0.414, $2\sqrt{2}$, and the Silver Ratio, 2.414.

For example, 22.5° is $\frac{1}{16}$ (or more significantly $\frac{1}{2^{2^2}}$) of a complete circle of 360°, and the tangent of 22.5° is 0.414. The remaining 3 segments of 22.5° together creates a segment that is 67.5, whose tangent is 2.414. These 2 segments together create a 90° quadrant with total tangent value of 2.828 (interestingly, *tan(90)=∞*). Unfortunately, $\frac{360}{67.5}$ give us a rather clumsy $5\frac{1}{3}$, but 720, or 360 × 3, 3 circles, divided by 67.5 gives us 16, which is that same $\frac{1}{2^{2^2}}$ relationship that 22.5 has with 360. In this way, each of these 2 segments which make up the the quadrant, which is the archetype of a the most fundamental shape in existence, will naturally tend to create a single a full circle and 3 full circles. In other words, where there is 1 there is 3, and where there are 3 there is 1.



So far, this falls more on the supportive side of the claim that 0.414 is the value of *creation*, or should we say a fundamental value of *creation*, as there are many more, such as the Silver Ratio, which is based on the same numbers:

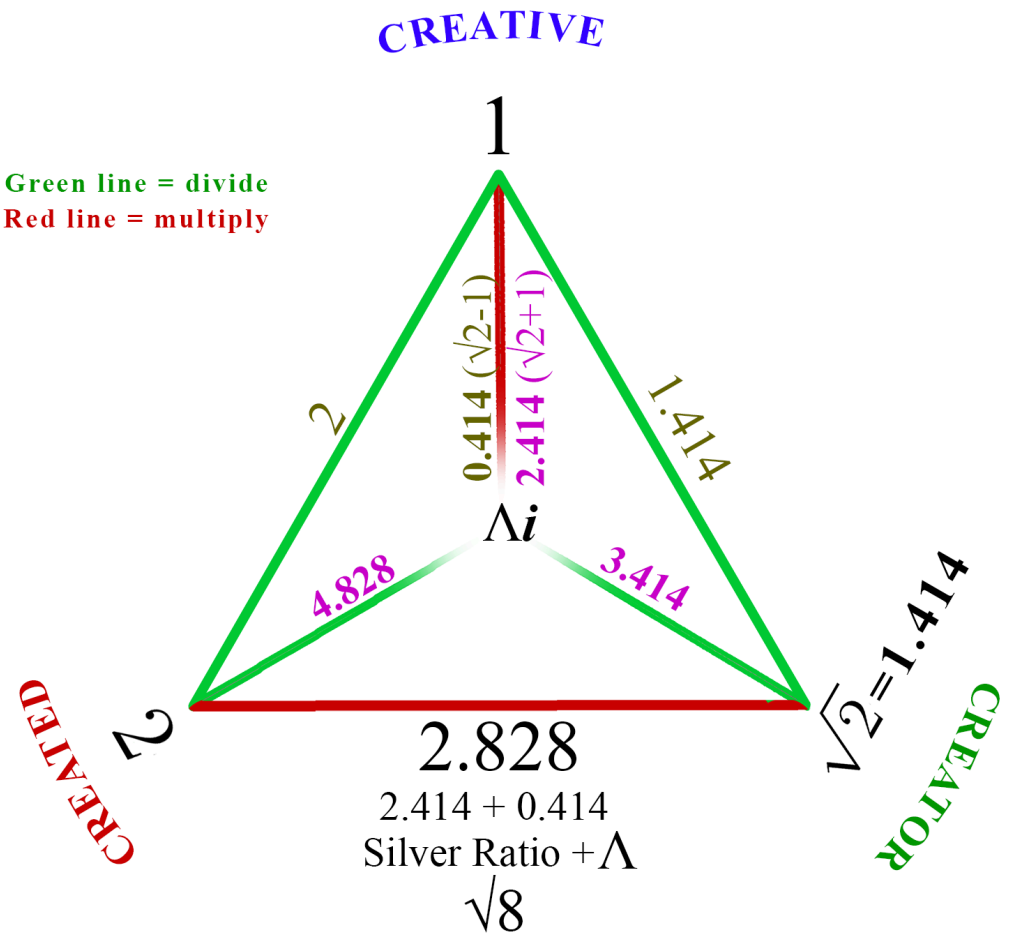
This unique value of 0.414, which we are suggesting is the difference between the *creator* and the *created*, a number of *creation* and *intention*, would probably have some interesting relations with the number 3, itself a number of creation, at least in the realm of tholonic archetypes and their instances. Let's see.

$\frac{3}{0.414}$ = *7.242*. This number also happens to be *2.414* × *3*, or $1+3\sqrt{2}$. Again, the Silver Ratio appears, but this time as a multiple of 3. So far, so good, but there's more,

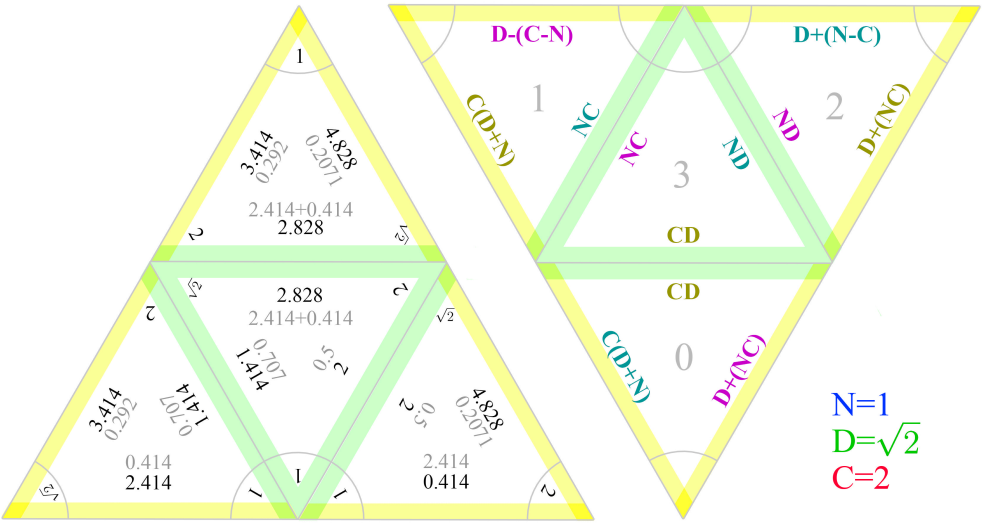
This is fantastically elegant in so many ways, and the recurring principle seems to be the Silver Ratio, which is based on 2.

For simplicity, let's assign *0.414* to a variable **Λ** (*upper case lambda*).

We could also then look for the qualities of *creativity* within the original *source* with 1÷**Λ**, which shows us that **Λ** is the inverse of *Silver Ratio*, or *2.414*. It also shows us several other interesting relationships especially when we map these values to the tholon. In the image below, green lines represent *division*, and red lines represent *multiplication*, in accordance with how we mapped Newton's 2nd law to the tholon.



Below is the 2D map for this above image to make the relationships more obvious, for example, how the lower-left trigram has the values Λ, +1, +2, +3; how lower left and lower right are naturally inverted, and when combined, equals the baseline of the top trigram which also has the values of *Silver Ratio* +Λ, +1, ×2, or how the central trigram is $\sqrt{2}$×1, $\sqrt{2}$×2, $\sqrt{2}$×$\sqrt{2}$, which naturally match the 3 corner values.

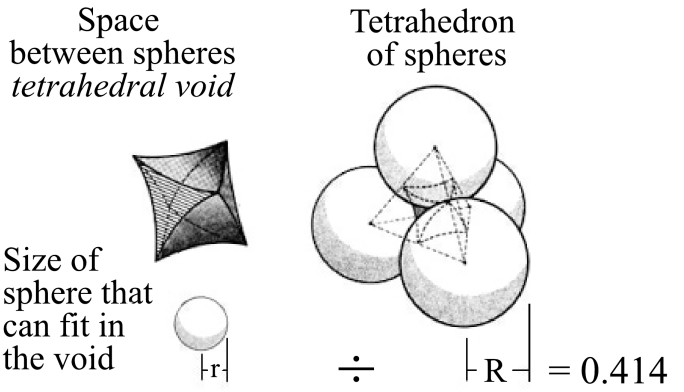


The arrangement of these values on the tetrahedron do not conform to Newton's 2nd, however, they seem to have a similar pattern, because if we apply the formulas of Ohm's law to these values, we get some very interesting values, all of which are the result of the numbers 1 and 2 only, and in one case ($V = \sqrt{PR}$) we see how it relates to π:

$$1.848 = \sqrt{Silver\ ratio \times 2}\ \textit{and}\ 2\cos\left(\frac{\pi}{8}\right)$$

Additionally, if we multiply all the values of each type (the equivalent to *V*, *I*, *R* and *P*), we get the a total value for each group where *R=1*/8, *P=8*, *I=2.230*, and *V=6.309*. With these values, the formula for *volts* produces $\sqrt{\frac{P}{R}}$=1, and the formula for *resistance* produces $\frac{V}{I}$= 2.828. These two values represent the N-source (1), and the N-child's spectrum (2.828), so, clearly, there is an order, as can be seen in the upper-right image that shows the formulas, but not exactly the same as Newton's 2nd. For example, the value for that vector which is the spectrum of instantiation between D and C has a value of the *Silver Ratio*+Λ (2.414+0.414), but if we replace the values with the *Newtonian* values of 6, 2, and 3, that same vector has the value of 6, and as we pointed out, 6 is the value of the initial creation, given it must be the value of the N-state. In one case, the value is arrived at by adding *Silver Ratio+Λ*, and in the other, it is arrived at by multiplying a *duality* (2) by the *trinity* (3), which is itself a number of instantiation if we accept "from 3 come all things". *Qualitatively*, these are the same expressions with 2 different contexts and scopes.

This value of **Λ** (lambda, 0.414) *might* be a good example of a tholonic *qualitative* value in that it was derived by the qualitative "formula" of *creation* or *intention* = *created* - *creator*. As we would expect, this number appears in nature, specifically, it is the ratio of the radius of a sphere that can fit in the empty space of a tetrahedron (*tetrahedral void*) created by 4 spheres. This may sound very obscure, but it is quite critical in the way atoms pack themselves together. This *tetrahedral void* is also a octahedron (the shape of nothingness), but made of spheres instead of tetrahedrons.



Another interesting point about 0.414 is that if we calculate the *axis of symmetry* between the values 1, 2, and 3, using the standard quadratic equation of $ax^2+bx+c=0$, we get the two values of $+0.414i-1$ and $-0.414i-1$, or $\sqrt{2}i-1$ and $-\sqrt{2}i-1$. Notice how these 2 results match the 2 values in the above 2D tholon map where **1** connects to **Λ**, the difference being the addition of ***i***.

Black Holes and Electricity

While we are on the topic of the number 2, there is another interesting pattern related to black holes.

The formula to calculate the radius of a black hole is quite simple: $radius = \frac{2G \times mass}{c^2}$, where *G* is the gravitational constant. Because we know that $mass = E/c^2$, we can write this formula as $\frac{2G \times (E/c^2)}{c^2}$. If we apply the rules described in *Chapter 5: Gravity* where we claim that *G* is equivalent to *V* (voltage), and in *Chapter 5: The Laws*, where we claim that *c* (speed of light) is equivalent to *I* (current) and equate *E* with *P* (power), we can write this formula as: $\frac{2V \times (P/I^2)}{I^2}$. Because $\frac{P}{I^2} = R\ (resistance)$, we can then say $\frac{2V \times R}{I^2}$. Using the smallest integer values that can be applied to *I*, *V*, and *R*, as described in *Chapter 5: The Laws*, we can write this formula several ways:

$\frac{(2\times6)\times2}{3^2} = \frac{12\times2}{9} = \frac{24}{9} = \frac{8}{3} = \frac{2^3}{3} = 2\frac{2}{3}$ = 2.666...

$\frac{2^2\times6}{3^2} = \frac{R^2\times V}{I^2}$ (using all properties of *R*, *V*, *I*)

$\frac{2^3\times3}{3^2} = \frac{R^3\times I}{I^2}$ (using factorials)

$\frac{64/3}{8} = \frac{8^2/3}{8} = \frac{2^6/3}{2^3} = \frac{R^V/I}{R^I}$ (based on 8)

There are many more ways to express this, each pattern exposing a different aspect of the same thing. Whether this "means" anything I can't say. Perhaps this is just *data* waiting to be turned into *information*, but I find it interesting how in describing the

virtual radius of a black hole (being it's in the context of electricity), we end up with a cube of length 2 and a volume of 8 (i.e., 2^3), and how $\frac{volume\ of\ cube}{dimensions}$ = *radius* of black hole in a different context. Given that the cube is also the archetypal geometry of *Contribution/form/integration*, and that black holes not only create galaxies, but may well create universes, this is an especially coincidental relationship. The cube is also associated with *acceleration* in Newton's 2nd law, *effect* in the cause/effect chain, and the archetype of *movement*, according to the association made in *Chapter 5: The Laws*.

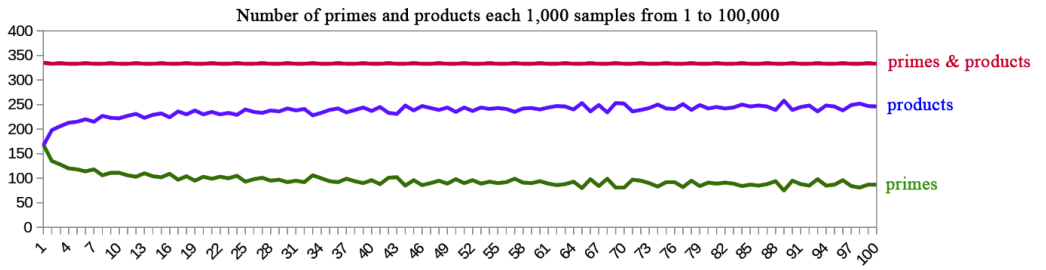
It's worth pointing out that when we use a trigram with side lengths of 2, we get the ratios of $\frac{quantum-probabilities}{relative-probabilities}$ as described above.

Prime Numbers

In the thologram, we consider prime numbers part of a more extensive set of prime numbers and their products (a number that can only be created by multiplying prime numbers greater than 3 together). This was not done by design. As we'll demonstrate, this set of numbers naturally occurs in the thologram in the green dot of *Limitation*/definition.

Likewise, the blue dot of *Negotiation*/balance and the red dot of *Contribution*/integration each have their own sets of values, and each set contains $\frac{1}{3}$ of all numbers. Given that primes occur less often as the numbers grow in size, then for primes and products to maintain a $\frac{1}{3}$ balance of all numbers, their products must increase proportionally… and they do. Below is a chart that shows this.

This *primes and products* set of numbers can be seen as either the remainder of all numbers *after* removing all the *÷3* and *÷2only* sets, each of which is $\frac{1}{3}$ of all numbers, leaving the remaining set which must, therefore, be $\frac{1}{3}$. This remainder is also all the numbers that are prime or a multiple of primes greater than 3, which just happens to be $\frac{1}{3}$ of all numbers. The former reason is consequential, and the latter is causal, which we would expect if the tholon of primes and products is both a *holon* and a *parton*.

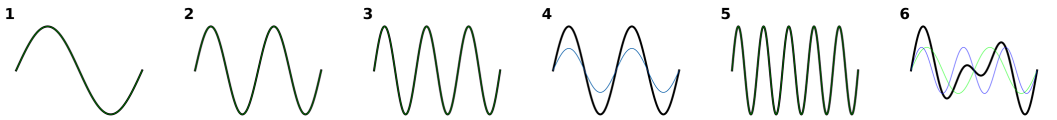


Prime numbers are defined as a number that is "divisible by exactly 2 natural numbers; itself and 1", natural numbers being any positive integer. As previously mentioned, the "exactly by 2" stipulation is recent and was only added for convenience. While

this definition describes a prime number, it doesn't say anything about the nature of prime numbers. A mathematician or cryptographer could explain the nature of prime numbers much better than whatever is said here. Still, we can at least say that prime numbers are the keystone building blocks of numbers, as *all* numbers can be reduced to a product of prime numbers, and prime numbers can't be reduced at all.

From the tholonic perspective, which considers A&I to be the source of all energy, concepts are an expression or instance of energy. While this energy may not be in the form of electricity or heat (although a nominal amount of both is required to maintain a concept), it is energy nevertheless and will contextually conform to fundamental laws of energy.

As numbers are concepts, how can we model them as forms of energy? As we have already seen, energy oscillates. We can look at numbers as different oscillations. This is similar to how we look at harmonic series, and we can apply those ideas here. We can imagine the most basic number, 1, as a singular instance of oscillation or as a single *cycle*, if we use the traditional vocabulary of harmonics. The number 2 would then be 2 instances of 1, 3 would be 3 instances of 1, 4 would be 2 instances of 2, etc.

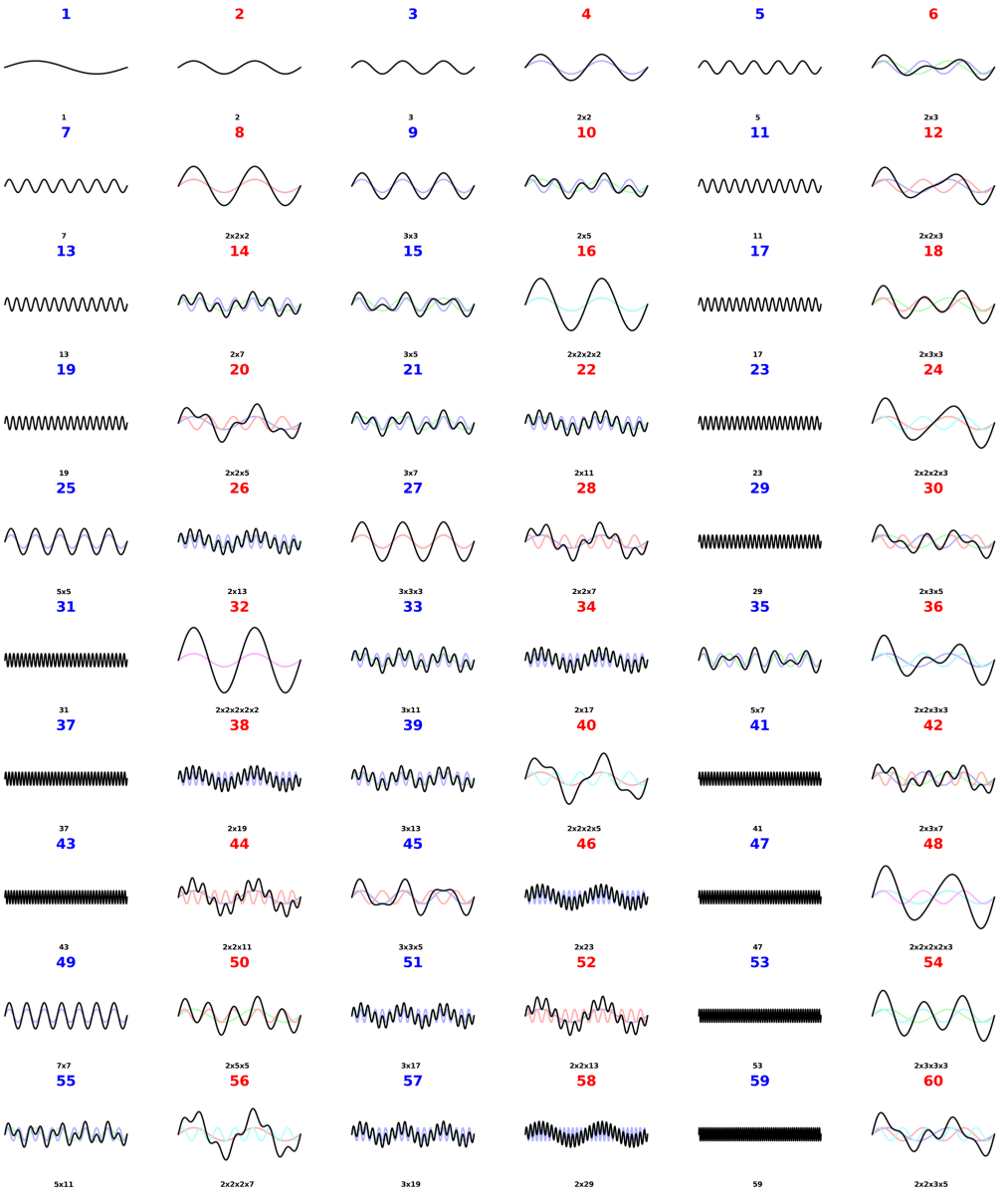


This idea creates simple waveforms at first, but that simplicity is due to 1, 2, and 3 being prime numbers (here, we take the Euler approach and recognize 1 as a prime number). If you look at #4 in the image above, it looks exactly like 2. Why not just show a waveform that had 4 cycles? If we look at numbers like instances of energy, w-e have to apply the laws of energy, the primary of which is "energy travels the path of least resistance" or the law of entropy. Because 4 is two 2s, the energy signature, so to speak, is that if 2, as 2 is what creates 4. Reducing a number to its most basic components, or *prime factorization*, will always reveal the smallest prime numbers that can create a particular number. Think of the number value as a value of *resistance*. 1 has the lowest resistance, so energy will always prefer to travel down that path, and we see that as 1 is the only number by which every number can be divided (and remain a natural number).

As 1×1 = 1, we can't create 2 from 1, so a unique concept of 2 has to be created. The same is true for 3. 4 is a more efficient way to express 2×2 (shown as 2 thin blue lines which appear as one as they are overlapped), but as 2 requires less "energy" or has less "resistance" than 4, a 4 will always be expressed energetically as two 2s. 5, being a prime number, has no factorization other than 1×5, so it instantiates as a wave of 5 cycles. 6's prime factorization is 2×3, and together they create a new unique waveform (black line).

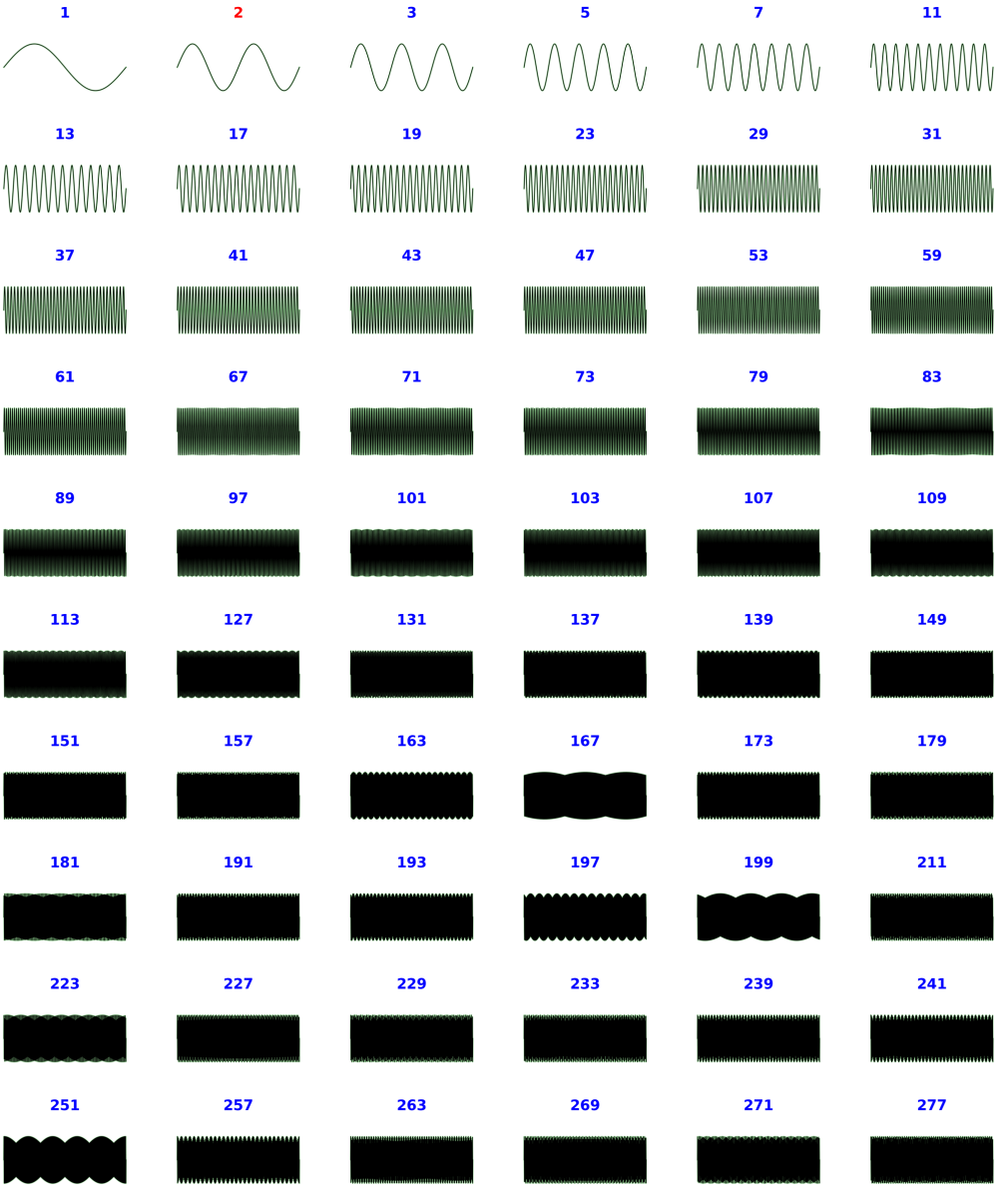
We can see from this little sample that the prime numbers (1,2,3,5) and their squares (1,4,9,25) appear to be pure, perfect, or monotone waveforms until we get to 6, the first number that has a complex waveform.

Here is what the first 60 natural number looks like using this technique (even numbers = red, odd numbers = blue):

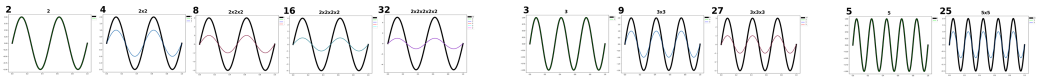


We first notice that prime number waveforms get denser and denser, which we would expect as they can not be reduced to any smaller number, but they also evolve in unexpected ways as we go high and higher.

Here are the first 60 prime numbers (on a slightly expanded scale):

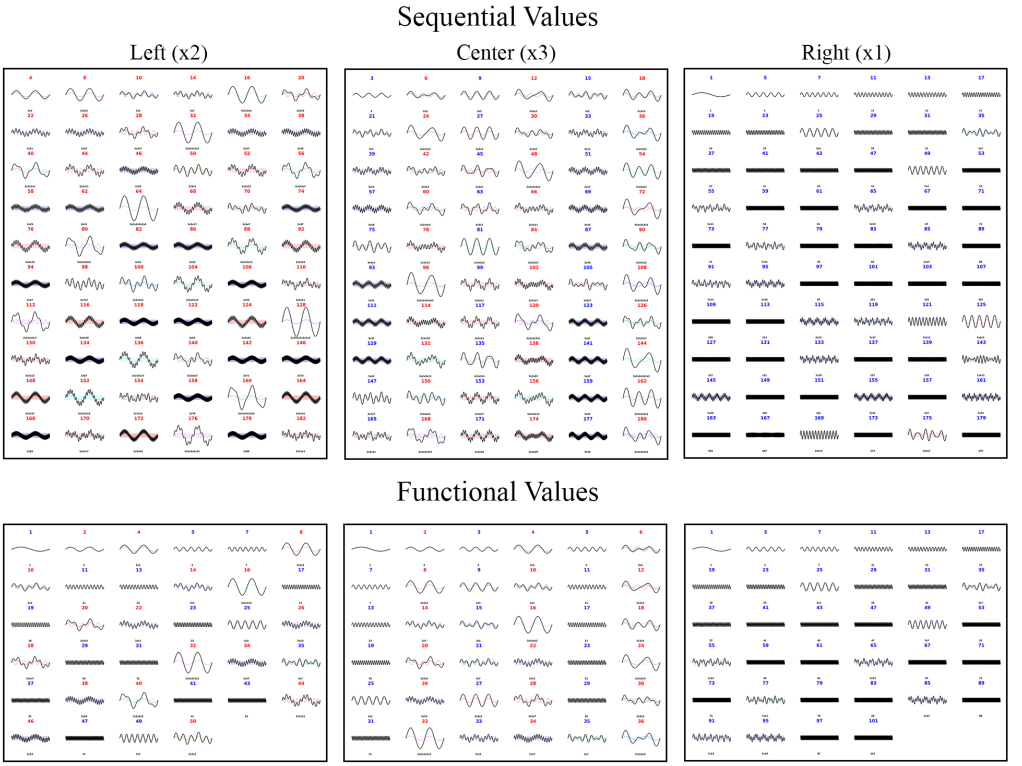


Another pattern we see is how exponential values are also “perfect”:

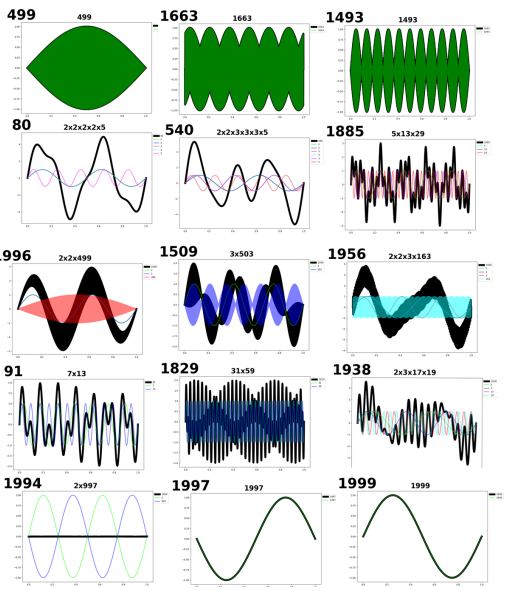


While these patterns may appear identical, they are not. The chart is too small to see the detail, but while the form is identical, the amplitude is not. 32 is 16 times larger than 2, but they both have an identical waveform. The #2 waveform is the simplest waveform that remains unchanged and the most common of all the “pure” waveforms.

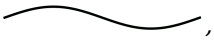
Regarding the 3 columns of the tholon, we have the following bird’s-eye view.



Some of the patterns are surprising. In the higher numbers, we can see the more extreme offsets from a perfect cycle of the prime number forms. This is because they come *near* to a perfect circle, but not exactly, so each cycle's offset increases a small amount each time. In practical terms, were prime numbers a sound wave, it would be a perfect monotone that never changes tone but with varying volume. #1994 is the only instance (from the limited samples) where the resulting waveform is that of 0.



The waveform of #1 rarely appears, and when it does, it's unexpected. For example, it first appears (after #1, of course) in #1997, and its reverse form in #1999.

Note: It may be that the correct waveform for #1 is not  *, but should instead be half of that,* *, which is how a cycle of 1 is shown in classical harmonics. Assigning #1 to a full cycle has more to do with keeping to tholonic patterns. In either case, the results are quite similar.*

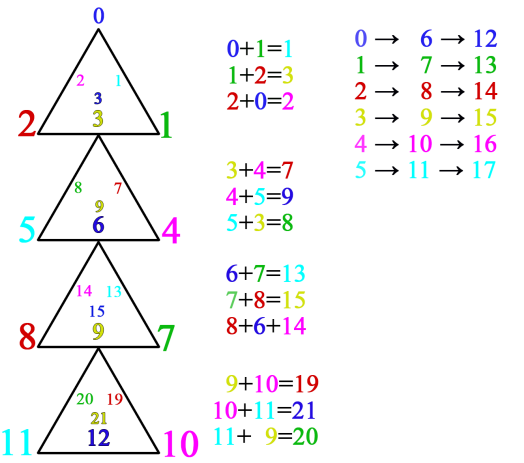
Numerical Values			Functional Values		
			x2	x3	x1
Left	Center	Right	Left	Center	Right
2	3	1	1	0	1
4	6	5	2	1	5
8	9	7	4	2	7
10	12	11	5	3	11
14	15	13	7	4	13
16	18	17	8	5	17
20	21	19	10	6	19
22	24	23	11	7	23
26	27	25	13	8	25
28	30	29	14	9	29
32	33	31	16	10	31
34	36	35	17	11	35
38	39	37	19	12	37
40	42	41	20	13	41
44	45	43	22	14	43
46	38	47	23	15	47
50	51	49	25	16	49
52	54	53	26	17	53
56	57	55	28	18	55
58	60	59	29	19	59
62	63	61	31	20	61
64	66	65	32	21	65
68	69	67	34	22	67
70	72	71	35	23	71
74	75	73	37	24	73

If we look at the “Right” columns of the tholonic values, we see both the *numerical* values and the *functional* values are identical, and they are only prime numbers and products of prime numbers (excluding 2 and 3). The “Left” column shows all even numbers for the *numerical* values and flipping between even numbers and prime-based numbers on the *functional* side. The “Center” columns show a perfect progression by 3 for the *numericals* and a perfect progression by 1 for the *functionals*.

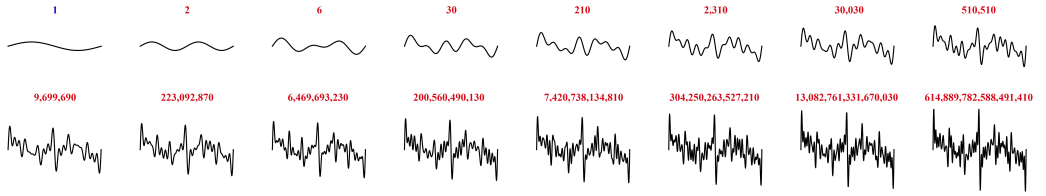
Each column represents one of the 3 types of numbers; *÷2only*, ÷3, and divisible by primes greater than 3. It also shows us that even numbers divisible by 2 and 3, such as 6, are actually in the class of *÷3*, or *center* values but just happen to be divisible by 2.

In the thologram, 3 is considered the first number from which all numbers emerge, as it is the first point of creation of a trigram, and its *functional* value, or archetype, is 0, the nothingness to the somethingness of all numbers. 0, 1, 2, and 3 express the first archetypes of numbers, those being *nothingness*, *somethingness*, *even*, *odd*, and *prime* and create the 4 classes of on number that every number is a member of. All numbers that follow have properties based on these archetypes.

For this reason, 4 is considered a generation of 1. However, as each generation is reversed from the parent, 7 is actually the 1st generation of 1, and 4 is the inverted transition of 1 to 8. An interesting observation is how the top 2 trigrams contain the longest set of contiguous set of numbers, which happens to be the set of 0-9. In this diagram (right) we use all 6 colors to show the difference between each generations, as we showed previously for the trigrams, even though we only used 3 colors for simplicity sake.



Getting back to prime numbers, the following image of the waveforms of values created by the first 16 prime numbers demonstrates exactly how this fractal expansion works as we can see how iteratively embedded waveforms build one top of each other.



1 1×2 = 2 2×3 = 6 2×3×5 = 30 2×3×5×7 = 210 2×3×5×7×11 = 2,310 2×3×5×7×11×13 = 30,030 2×3×5×7×11×13×17 = 510,510 2×3×5×7×11×13×17×19 = 9,699,690 2×3×5×7×11×13×17×19×23 = 223,092,870 2×3×5×7×11×13×17×19×23×29 = 6,469,693,230 2×3×5×7×11×13×17×19×23×29×31 = 200,560,490,130 2×3×5×7×11×13×17×19×23×29×31×37 = 7,420,738,134,810 2×3×5×7×11×13×17×19×23×29×31×37×41 = 304,250,263,527,210 2×3×5×7×11×13×17×19×23×29×31×37×41×43 = 13,082,761,331,670,030 2×3×5×7×11×13×17×19×23×29×31×37×41×43×47 = 614,889,782,588,491,410

Or, perhaps better displayed in the following format with the cross-sum values, which is interesting as they are all 6 or 3 (after 1 and 2, of course).

1 → **1** 1 × 2 → **2** 2 × 3 = 6 → **6** 6 × 5 = 30 → **3** 30 × 7 = 210 → **3** 210 × 11 = 2,310 → **6** 2,310 × 13 = 30,030 → **6** 30,030 × 17 = 510,510 → **3** 510,510 × 19 = 9,699,690 → 48 → 12 → **3** 9,699,690 × 23 = 223,092,870 → 33 → **6** 223,092,870 × 29 = 6,469,693,230 → 48 → 12 → **3** 6,469,693,230 × 31 = 200,560,490,130 → 30 → **3** 200,560,490,130 × 37 = 7,420,738,134,810 → 48 → 12 → **3** 7,420,738,134,810 × 41 = 304,250,263,527,210 → 42 → **6** 304,250,263,527,210 × 43 = 13,082,761,331,670,030 → 51 → **6** 13,082,761,331,670,030 × 47 = 614,889,782,588,491,410 → 93 → 12 → **3**

Thologram and Prime Numbers

The embedded nature of the thologram naturally creates sequences of many different patterns and values. The simplest sequence is that of incremental counting starting from 0, as in 0, 1, 2, 3, 4, 5, etc., and being the simplest sequence, we would expect to see some very fundamental patterns emerge. Below are some diagrams and tables that illustrate this simple sequence.

Values based on 2D trigram map

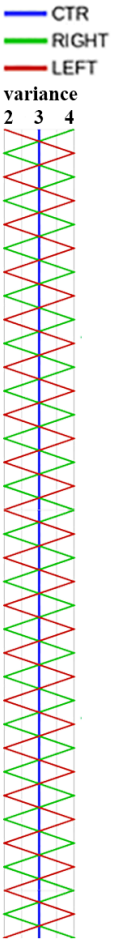
Prime factorization by column
divided by column's function

LEFT (×2)	CTR (×3)	RIGHT (×1)
1	0	1
2	1	5
2×2 *(4)*	2	7
5	3	11
7	2×2 *(4)*	13
2×2×2 *(8)*	5	17
2×5 *(10)*	2×3 *(6)*	19
11	7	23
13	2×2×2 *(8)*	5×5
2×7 *(14)*	3×3 *(9)*	29
2×2×2×2 *(16)*	2×5 *(10)*	31
17	11	5×7
19	2×2×3 *(12)*	37
2×2×5 *(20)*	13	41
2×11 *(22)*	2×7 *(14)*	43
23	3×5 *(15)*	47
5×5 *(25)*	2×2×2×2 *(16)*	7×7
2×13 *(26)*	17	53
2×2×7 *(28)*	2×3×3 *(18)*	5×11
29	19	59
31	2×2×5 *(20)*	61
2×2×2×2×2 *(32)*	3×7 *(21)*	5×13
2×17 *(34)*	2×11 *(22)*	67
5×7 *(35)*	23	71
37	2×2×2×3 *(24)*	73
2×19 *(38)*	5×5 *(25)*	7×11
2×2×2×5 *(40)*	2×13 *(26)*	79
41	3×3×3 *(27)*	83
43	2×2×7 *(28)*	5×17
2×2×11 *(44)*	29	89
2×23 *(46)*	2×3×5 *(30)*	7×13
47	31	5×19
7×7 *(49)*	2×2×2×2×2 *(32)*	97
2×5×5 *(50)*	3×11 *(33)*	101

Sequential values

LEFT	CTR	RIGHT
2	0	1
4	3	5
8	6	7
10	9	11
14	12	13
16	15	17
20	18	19
22	21	23
26	24	25
28	27	29
32	30	31
34	33	35
38	36	37
40	39	41
44	42	43
46	45	47
50	48	49
52	51	53
56	54	55
58	57	59
62	60	61
64	63	65
68	66	67
70	69	71
74	72	73
76	75	77
80	78	79
82	81	83
86	84	85
88	87	89
92	90	91
94	93	95
98	96	97
100	99	101

Pattern of variance



We end up with the "*Sequential values*" table of 3 columns of values; center, right.

- The center column, which is where the counting starts, has the sequence 0, 3, 6, 9, etc. All the numbers are divisible by 3 and are colored blue.

- The right column has the sequence 1, 5, 7, 11, etc. All the numbers are prime numbers or products of prime numbers *that are not 2 or 3* and are colored green. We'll refer to these values a *rPrimes*.

- The left column has the sequence 2, 4, 6, 10, etc. All the values are divisible by 2 and are colored red.

Because of this commonality by column, we can assign the right, center, and left columns the properties or functions of ×1, ×2 and ×3.

The table on the left, "*Prime factorization*", shows this multiplying function for each column and the values that, when multiplied by the columns function, result in the sequential value.

In this table, the factorials are the same coloring as *Sequential values*.

- rPrimes are green cells.
- divisible-by-2 based products are red cells.
- divisible-by-3 products are blue cells.
- divisible by 2 *and* rPrimes are yellow cells.

In both tables, the numbers 0 and 1 are considered special cases as they are "special" numbers.

Here's an example of how to read the "*Prime factorization*" table values:

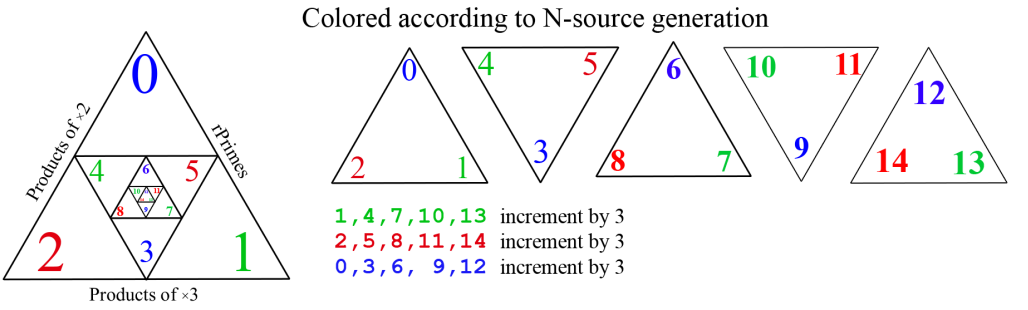
The sequential value of 28 has the prime factors of 2×2×7. As 28 is in the left (×2) column, we show only 2×7, which when ×2 is 28. These truncated factorializations are called the *trigram values*. The function of the column (i.e., ×1, ×2, ×3) is applied to the *trigram value* to produce the sequential value. In this case, 2×7, being in the left column, is multiplied by 2, resulting in 28. So, a trigram value of 7 produces the sequential value of 7 when in the center (×1) column, 14 when in the left (×2) column, and 21 when in the center (×3) column.

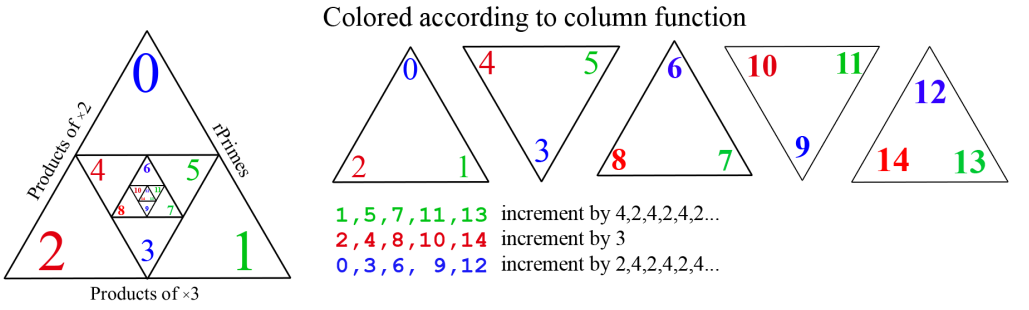
The 1st value of the center column is the 1st instance, where the counting, or creation, begins from. The 1st instance of a value is then 0 in the center (×3) column. In the "*Sequential values*" table, all values in the the center column are always, and only, products of 3, so we know that the center value will always be 3 × the level of the embedded trigram. i.e., the 4th level of an embedded trigram will have a center value of 3×4. The exception to this appears to be the initial value of 0, but as this initial value is a product of 0×3, 0 is still a product of 3.

The "*Pattern of variance*" charts plots the difference between sequential values in each column of "*Sequential values*". For example, the right column has the values 1,5,7,11,13, etc. The difference between these values is 5-1, 7-2, 11-7, 13,11, or 4,2,4,2,etc. The center difference between center column values is always 3, and the difference between left columns values is 4-2, 8-4, 10-8, 14-10, or 2,4,2,4, etc., which is exactly the same as the right column difference, but offset by one place.

This variance is also seen the numbering in the values along a the left and right axis of the trigram.

We now have different models of progressions depending on our perspective, because, if you remember how the sequence of the thologram was generated, each child thologram was the inverse of the parent, which creates a different sequence than that created by the column functions.

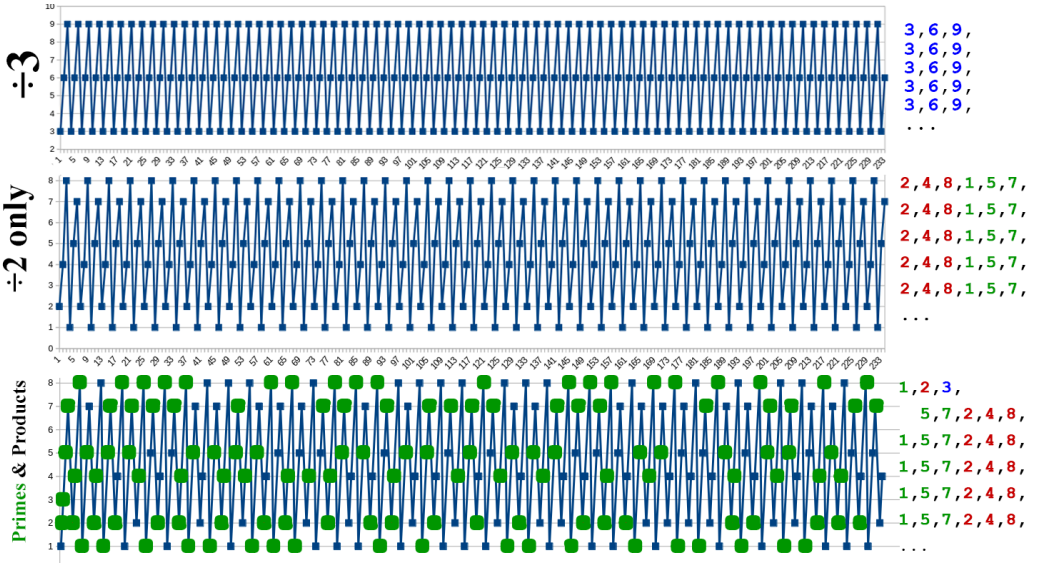




This difference in sequence only effects the attributions of the polar children of *Definition* and *Contribution*, and not the attribution of Negotiation, but the difference is that in the column functions, they alternate position every other generation. So, either the polar attributes oscillate and and all the increments remain the same, or the polar attributes stay the same, and their increments oscillate. This is similar to sitting in a train at a train station, and the train next to you starts to move. For a moment, you are not sure which train is moving. If all we are interested in is the relationship between the 2 trains, it doesn't matter which train is moving.

You can see how the right column also holds all the primary numbers, except the numbers 2 and 3, and we know that prime numbers are perfectly unpredictable because we know that the pattern of prime numbers are unpredictable, and if the primes are unpredictable, then the products of primes are also unpredictable. So, while we can't predict where a prime number will be, we can predict where either a prime number or a product of prime numbers *that are not column functions of 2 or 3* will exist. The rule is, any number that when divided by 2 and by 3 result in two fractions is a prime number or a product of a prime number. This holds true for any number after 4. Interestingly, by this rule rule, the number 1 is a prime number and 2 and 3 are not. For the record, up until the early 20th century, 1 was a prime number, but was demoted from prime status simply due to convenience. Euler, perhaps the greatest mathematician who ever lived, took a more fluid approach; sometimes he used 1 as a prime, and sometimes he adopted the Greek idea that 1 is not even a number, but rather the progenitor of numbers. This seems the most sensible approach because unlike all other numbers, the number 1 has many faces.

The thologram has the concept of a tholonic prime, which is a unique value that can't be a product of any smaller numbers. This is more or less the same definition as a regular prime, but it includes 1, and even 0. In this way, the first order of tholonic primes are 0,1,2,3, (which are also the values of the first tetrahedron) and all numbers that follow are secondary tholonic primes (which are the same as modern traditional primes).



Another interesting pattern we can see in the numbers of these 3 columns is their crosssum values, or the value of the all the numerals in a row added up, i.e., 123 as 1+2+3=6 (see *Appendix F, "An Unexpected Pattern"* for more information on cross-sums). These cross-summed values, while loosing their quantitative value, expose their qualitative values. If we look at how the values in the "*Sequential values*" table change, we see 3 distinct patterns. The *÷3* (center) column follows the simplest pattern 3, 6, 9, and is the only pattern that is a single "frequency". The *÷2only* (left) is 2 "frequencies", or rather "waveforms", that of binary growth, [2,4,8] (or [2^1, 2^2, 2^3]) and that of prime number growth, [1,5,7]. Again, notice how 2 and 3 seem to be outside the set even though they are prime numbers. We can say that [1,5,7] are the first 3 prime tholonic prime numbers excluding 2 and 3.

The crosssums of the center and the left columns together use every number 1-9. The *Primes & Products* (right) column starts with 1,2,3, and then continues with the same frequencies as the left column, but in opposite, or reverse order.

In total, we have 3 unique 'frequencies', the 3-based [3,6,9], the 2-based [2,4,8], and the prime-based [1,5,7]. If cross-sums show the qualitative properties, then we can say that the [3,6,9] is the pattern of *Negotiation*, balance, and stability. The right column, that of *Limitation* and definition, is an unending stream of the numbers [2,4,8,1,5,7], and the left column, that of *Contribution* and integration, is the stream of [1,5,7,2,4,8].

The difference between these infinite series of numbers, if we add the right column and subtract the left, is +1, -1, +1, -1, +1, -1, and it is this oscillating series that defines the spectrum across with new *N-states* can appear. You'll notice this series of

primes and products does not start out with this pattern of [1,5,7,2,4,8], but rather with [1,2,3,5,7,2,4,8], but the [1,2,3] is then replaced with [1] for the remainder of the series.

We argued previously that the first tholon, which contains the numbers [0,1,2,3], should be considered in a class by itself, as it (and its numbers) is the archetype of all the trigrams (and numbers) that follow. In this number series, we are literally being told that the number 1, the archetype, or tholon, of all numbers, contains 3 *partons*, and those partons are themselves tholons that exist as the 3 columns of the thologram, *÷3*, *÷2only* and *primes and products* of which the tholon of 1 is also a *parton*. This is another example of the fractal and self-similar nature of numbers.

This anomaly in the first instance of the pattern is significant in another way as well as it appears in, and only in, the domain of *Limitation* and definition, as it is the archetype, or tholon of [0,1,2,3] that not only forms the 1st tholon of creation, but limits and defines every number that exists.

If the concept of 1 is a tholon, then what are the 3 “perspectives”, or “faces”, or *partons* that are required for a tholon to exist? Here we are shown that those 3 *partons* are the values [1,2,3], which means that the (tholonic) definition of the number 1 (as well as 2, and 3) is an infinite, self-referencing, circular recursion.

What *π*, 2, 5, and *e* in common

This topic probably qualifies as an appendix; however, it’s too significant not to place front-and-center, as it is fundamental later in the book when we consider where all universal knowledge is stored and how to access it.

A fascinating pattern in the thologram shows not only that of π, 3.1415924, but also the transcendental part of π, or 0.1415924. This value is the part left over when you take 3 perfect trigrams and curve their outer edges to form a half circle (shown below). Because a curved line is an infinite number of points, as opposed to a straight line, which is 2 points, the transcendental part of **π** represents the difference between the archetype of a singular instance of the simplest and most balanced form that can exist and the archetype of the form that is created by an infinite number of trigrams. The same applies to that of a tetrahedron and a sphere, the most common form in the Universe, but as spheres are 3D, the difference is π^2.

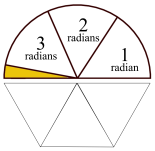
Interestingly, when we square the transcendental part, $(\pi\text{-}3)^2$, we get the value 0.02004847955, which is 5/10,000ths off from 2/100. As $\sqrt{\frac{2}{100}}$ = 0.14142135623, we can approximate π with $3+\sqrt{\frac{2}{100}}$ or, if we just use prime numbers, $3+\sqrt{\frac{2}{2^2\times5^2}}$. This approximation is off by 0.00017 (0.00546%), which is far better than the traditional approximation of $\frac{22}{7}$, which is off by 0.003 (0.04%), but not as good as $\frac{333}{106}$, which is only off by 0.0026%.

(*Apologies to math purists, but as there is no symbol for the transcendental part of* ***π****, we'll be using the capital omega character,* ***Ω****, a catch-all symbol for the "end", to represent that value, and also the small omega character,* ***ω****, to represent the component values derived from the fractions that lead to* ***Ω*** .)

There have been, and are, many creative interpretations of π; books have been written on its mystical properties, calendars have been created based on π, and π even has its day, March 14 (3/14, obviously), that is celebrated globally (usually involving some actual pie) and is even sanctioned by the U.S. Congress and UNESCO. If you appreciate cosmic coincidences, Albert Einstein was born on Pi Day, 1879 (as well as famous porn star Sasha Gray, 1988). In this case, Ω represents the infinite part of π, and 3 represents the finite part… nothing too mystical or philosophical there, but it is curious that π starts with a finite value (3) and ends with an infinite value(Ω).

$$a)\quad \left(1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} \ldots\right) \times 4 = 3.1415924\,(\pi)$$

$$b)\quad \left(1 - \frac{4}{3} + \frac{4}{5} - \frac{4}{7} + \frac{4}{9} - \frac{4}{11} \ldots\right) \times 1 = 0.1415924\,(\Omega)$$



In example ***a)***, if we alternately subtract and add the inverse of the number of tholons for each row (1, 3, 5, 7, 9,…) and multiply the result by the number of sides (4), we end up with 3.141592, which is the value of **π**. Leibniz originally discovered this pattern which is appropriately called the *Leibniz formula for pi*.

In example ***b)***, we use the same formula as ***a)***, but with swapped numerator values of 1 and 4. Why? Because 1 as a numerator (in ***a)*** describes the unity of a tholon with 4 contexts (sides). This is the perspective of a *holon* with its 4 contributing *partons*. In ***b)***, the 4 describes each contributing element to the tholon, i.e., the perspective of the *partons* relationship to the *holon*. In the context of ***a)***, **π** represents the *holon*, which, being tetrahedral, is a tholon. As a complete tholon requires 2 tholons, it would be represented as **2π**, and, in fact, **2π** radians is a complete circle and represents the defining or limiting context for its *partons*.

From a geometry perspective, if we look at the basic 2D map of a tholonic matrix, we can see that it is a 2D trigram as well as the makings of a 3D tetrahedron as 4 trigrams so that we can consider this in both perspectives; each individual trigram as one side of an existing tetrahedron, or as four trigrams that join together to form a potential tetrahedron. Example ***a)*** considers one side to an existing tetrahedron. The formula counts the tholons by the rows of the entire trigrams (as a side), then has to multiply by 4, the total number of sides needed for a tetrahedron, to get **π**. With this formula, each of the 4 sides contributes 1/4 of the solution, which we would expect as we are looking at only 1/4 of the tetrahedron. Example ***b)*** considers the tholon as one whole made of 4 sides and therefore need only multiply by 1, and in this way, it arrives at **Ω**.

So what is this suggesting? That the instantiation of π, which never ends, begins with the first instance of the primal archetype of the original 0-dimensional dot of A&I when that 0-dimensional dot became two to form both the concept of a line and the 1st dimension. We will see this again in the next chapter when we explore the tholon's relationship with Euler's *God Formula*, $e^{i\pi}+1=0$, the "most elegant formula in math".

Note: As more detailed (and somewhat circuitous) description for those who enjoy math and numbers but is not necessary for the overall understanding of the thologram can be found in the following section titled "The Entropy of Numbers"

The Entropy of Numbers

If you were asked what pair of numbers, when added together, make 4, you'd probably say 2+2 or 1+3. You would probably not say $\sqrt{10.6933136688}+0.90038532821^3$ because, even though it is correct, it makes no sense, adds no useful information, and requires a lot of work to provide. You would naturally provide an answer that was easiest to arrive at, easy to comprehend, and has a chance of being useful information. This might sound like common sense, but only because it is common to do things that are more efficient, practical, and useful than inefficient, impractical, and useless. But why do we even care about that in the first place? The answer is that any movement of energy always travels the path of least resistance. Thinking requires work, and ideas and concepts require work to be maintained. This is common knowledge, but we tend to only apply the concepts of energy in a thermodynamic or electrical context. The instance of the laws of energy outside of those contexts can be found in anything and everything that is the result of energy, which is every context possible.

The movement of energy is the balancing of an imbalance. The first law of energy is that it will always move toward balance. Thought is energy. Ideas are energy. Concepts are energy. How, then, does this law of balance manifest in ideas, thoughts, and concepts? First, we need to ask how ideas, thoughts, and concepts came to exist in the first place. The traditional view is that our meta-awareness results from our evolved neurology. While that is true, the tholonic view is that our neurology is an effect, not the cause. What is the cause? The movement of energy, which forms patterns, which become partons of yet more complex systems, living systems. If the Universe, and everything in it, is the result of a 0-dimensional concept whose only attributes are A&I, then not only are all things that exist instances of, and have the qualities of, A&I, but the expression of A&I is the very reason for their existence and the driving force behind evolution, growth, and direction.

For us humans who have managed to evolve a *ventrolateral frontal cortex*, we have been able to discover and invent the miraculous tools of thought, ideas, and concepts, which has brought humanity to a new level of discovery and creation. Of all these advanced tools we have managed to evolve, the great under-sung hero, and by far the most powerful is that of curiosity. All creatures may be curious to a degree, but humans stand alone in their ability and capacity to ask "why?" and "how? and then find an answer. Curiosity is the most powerful driving force for the self-aware being, more potent than even the need to survive, as curiosity has been the end of many an explorer.

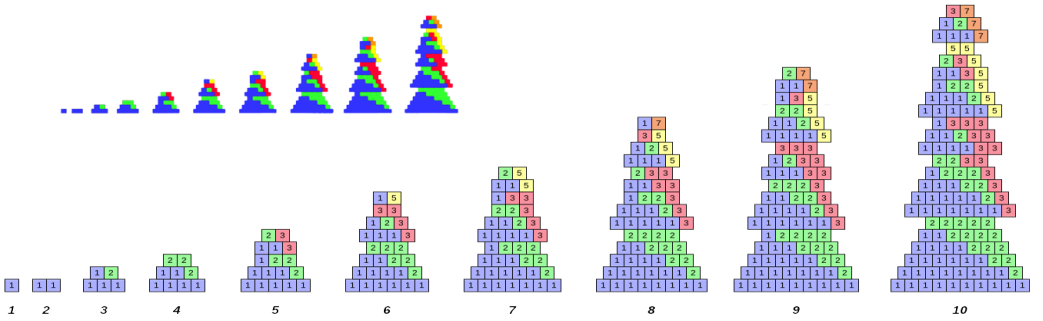
Why is there a $1,000,000 reward for finding the solution to $a^x + b^x = c^x$? Why do we ask “What if?” or the proverbial question, “What happens when I press *this* button?” Why have we spent years, effort, and money to discover ever-larger prime numbers (currently at $2^{82,589,933}$ -1, a number that has 24,862,048 digits)? What drives us to calculate π to the $2{,}000{,}000{,}000{,}000{,}000^{th}$ place? *Curiosity*. This may sound overly simple, but there is nothing simple about curiosity. Curiosity is hardwired into our being. It makes the brain more efficient, expands our options, and leads towards the unachievable balance between the 3 states of knowledge; *what we know*, *what we know we don’t know,* and *what we don’t know we don’t know*. Our brain rewards us in the form of dopamine when we have learned something, found an answer to a question, or solved a problem, especially when the motivation is internal rather than external, learning for the sake of learning vs. learning to pass an exam. The degree to which our aggressively unnatural modern society has altered and/or manipulated these evolutionary circuits is a conversation worth having but is not relevant to the point that all life, being an expression of energy, will replicate the patterns of energy across all contexts. Curiosity is not born of a human or animal trait; it is the movement of energy in the realm of archetypes, and as we explore the world of abstract thought, we become the conduits for that energy. Curiosity is an instance of the energy moving through the circuits of life in the context of a self-aware mind. It is that same energy moving through every context, making all that exists active elements in a living circuit.

“Knowledge is light, ignorance is darkness” is a very common phrase and metaphor, but why do we naturally equate light with knowledge and that which is “good”? Perhaps it is because we know at the cellular level, and after 4 billion years of evolution, that light is life. Although less poetic, it would be more accurate to say, “Energy is life”, given what we have learned about light and energy. Still, as we only discovered this fact a little while ago, starting with the works of Isaac Newton, and taking another leap with the works of Albert Einstein, I assume that the phrase predates those giants by millennia in one form or another. We could go further and say, “Energy is existence”, and if energy is existence, then existence, i.e., all that is; life, planets, plants, aliens, etc., is not only subject to the rules of energy but is *formed* by the rules of energy.

If the above is true, we should be able to identify the fundamental laws of energy, such as entropy, resistance, potential, charge, etc., in any context. One obvious example is heat. It is one instance of energy that is the same for all contexts and things, as there is nothing in this Universe that has no heat, even the empty void of deep space.

So how does this apply in the context of concepts or numbers? Let’s take the concept of entropy. Entropy is defined as a value of the amount of energy that escapes a system and is proportional to the number of *microstates* available. The number of *microstates* is defined as *“the number of ways system components can be arranged without changing its energy”*. In other words, the higher number of microstates, the more ways energy can dissipate and the higher the entropy. Can this concept apply to other types of energy, such as the energy of the concept of numbers? Using the same definitions, we can then say the entropy of a number is “*the number of ways a value’s components can be arranged without changing its value*”. For example, when dealing with only natural numbers (excluding 0), the value of 3 can be “arranged” as 1+1+1

and 2+1, which would be the equivalent of 2 microstates. The chart below shows the "microstates" for the numbers 1-10 using only prime numbers (the inset is only meant to make the patterns more pronounced).

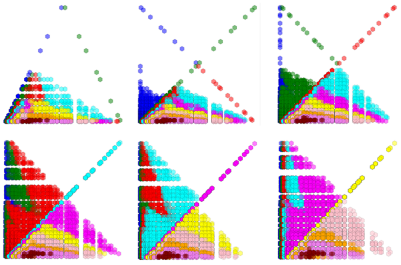


There are 23 ways (or "microstates") to make the value of 10 using unique combinations of prime numbers, starting with 1+1+1+1+1+1+1+1+1+1, which requires the least amount of "work", ending with 3+7, which requires the most amount of "work".

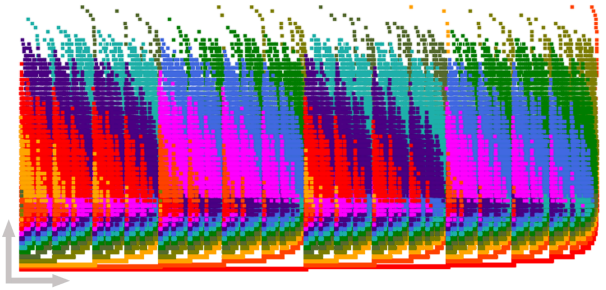
Besides this form of numeric constructions being the same process used by the Pythagoreans when analyzing the properties of a number, the reasoning behind how these number towers are formed is straightforward; create each "microstate" starting with the "simplest", "least resistance" or "lowest entropy" numbers, and keep adding until you get to the final value. In the example above, we only use prime numbers, but the same process works when using all numbers or when using only single instances of numbers. It's debatable which is more 'accurate'. As this is mainly a conceptual exercise to demonstrate that we can apply energy concepts to numbers, it may not matter. However, the sort order shows an interesting fractal pattern of trigrams, each representing a new level or value. The order is defined by 3 simple rules meant to emulate the natural world: 1) The smallest numbers must first be used (from left to right). 2) When all possible combinations are exhausted, a new number will be created using the least amount of "work" possible. 3) Only numbers that have already been created can be used.

Using the unique prime number arrangements (like above, but only using any number once in a set), the chart below shows the 53,041 possible configurations that can produce the number 300. We won't get into the details of the graphs, but there are two points worth a closer look: the persistent presence of both trigram relationships and patterns (left) and binary expansion (right). The most interesting regarding the binary expansions is that the first 7 or 8 layers show a clear and consistent binary pattern. The next 7 or 8 rows begin to show changes emerging. Beyond that, we begin to see the beginning of the fractal nature of these "microstates" with patterns and colors replicating and flipping every 2^n columns becoming more and more chaotic, like leaves of grass flowing in the breeze.

Note: In both charts, the colors follow the spectrum from dark-red to fuchsia (bright violet), with dark-red presenting the lowest number in a set that sums to 300 and fuchsia representing the largest number in that same set. Each dot also has a depth, creating a Z-axis which is not shown that looks similar to the vertical/Y-axis



Patterns formed when plotting the nth prime number (1-6 shown here) against all primes of same set.



Distribution of prime numbers for each of the 53,041 "microstates' of the number 300

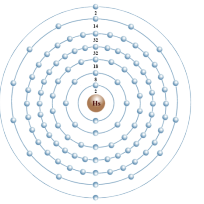
Applying the concept of microstates to numbers suggests that large numbers "dissipate" faster than small numbers. In one way, this is true, as the dissipation of energy is actually the energy balancing itself out by distributing itself evenly across its environment via the microstates. The number 2 can be distributed only as 1+1, but 300 can be distributed in 53,041 ways. How many ways can the number 12,345,678 be distributed? We can't know that answer without counting every possibility as there is no way (I believe) to predict this value as it depends on when prime numbers appear, which are themselves unpredictable. Technically speaking, 1 can't have a microstate because, by definition, 1 is *unity*; it has no sup-parts because it was created from nothing, 0. Therefore, 1 can only have a *macrostate*, and that *must* be the only *macrostate* that can exist.

A more concrete example of applying entropy to numbers is that of water pipes. The larger the pipe, the lower the entropy. A water pipe with 0 entropy, or 0 resistance, would have to be as large as theoretically possible. This would equate to the number 1, or the singular 0-dimensional dot of A&I, or the entropy of the Universe at the moment of the Big Bang (which was actually 10^{88} k_B, so, while not 0, it was the lowest amount of entropy that will ever exist, as that value today is 10^{103} k_B and will continue to grow over the next 10^{20} years until it maxes out at 10^{123} k_B). The first finite water pipe, or the first instance of resistance or limitation, would be equivalent to the value of 2. We can see this concept in how all numbers are divisible by 1, but only half are divisible by 2. More resistance gives us 3, which $\frac{1}{3}$ of all numbers are divisible by, etc. In this water example, the "size" of the water line is the inverse of the value. So, a water pipe of 1, where 1 represents the *unity* of all that exists, means that the water pipe is as big as *unity*, as *unity*÷*1*=*unity*. A pipe as large as *unity*÷2 is half the size, etc.

Just like water and electricity, if we double the resistance (or make the pipe half the size), we get half the current (or half the water), so as far as efficiency is concerned, two 2s are identical to one 4… at least this was the reasoning behind using only prime numbers.

The value of 1 alone has 0 microstates, and as such, its energy can't move anywhere *within itself* and therefore has 0 entropy. We know from classic entropy that this suggests maximum pressure, maximum order, and maximum impetus. As there is nowhere for 1 to expand to *within itself*, the "energy", which *must* move, is forced to create a new state or value *outside of itself* that requires the least amount of "work".

This would be the value of 2. The value of 2 has one microstate and therefore has higher entropy, slightly less pressure, and order and represents a more balanced, distributed condition of the “energy” of 1.



We see this same type of expansion in simple math when we have to create a new “place” when we add 1 to 9 to get 10, and we also see it in electrons when they get energized and jump to their next higher orbit of the 7 orbits that exist in every atom (image right). This is also the source of all light because when the electrons drop from a higher orbit to a lower orbit, they emit the excess energy that is no longer needed to maintain that higher energy state as a photon of electromagnetic energy (of course, the reality of these orbits and states is quite a bit more complex than the image suggests).

We took the long way to get to the point where we can demonstrate that binary counting is the most efficient way to count and that counting naturally occurs in the movement of energy. OK, maybe not the most efficient way for humans, but the context of humans is quite different and far more restricted than that of the Universe. Surprisingly, no culture used binary counting until 1963, when IBM came up with the idea to use it for computers. The one exception to this is the binary-based, meta-physical Taoist writing titled the “I Ching” (“Book of Changes”), which dates back to ancient times. Still, this material was not considered practical or valuable (by Western culture) and was relegated to mysticism and lore.

*Note: To avoid confusion between the bases, binary numbers are preceded with a “**b**”.*

The binary system of numbers is not only the most efficient, but it is the only counting system that contains the most efficient recipes for creating any value. For example, let’s say we have a result of some addition that equals 10. We could have arrived at that value by adding 4+6, or 9+1, etc. However, in the binary system, the value of 10 is represented as *b*1010, so we automatically know that the most efficient way to create 10 is by adding *b*1000 (8) and *b*10 (2). Any other combination of values would require more “work”. Here are all the possible combinations of creating 10 with pairs of numbers. They are listed in ascending order of “work” required. As we would expect, the most efficient formula is that which is based on 2, as in 2^1+2^4.

0010+1000	2+8	2^1+2^4
0001+1001	1+9	$1+3^3$
0100+0110	4+6	2^2+2x3
0101+0101	5+5	5+5
0011+0111	3+7	3+7

Consider the binary number *b*11010011 (211). How long would it take to discover the most efficient numbers that sum to this? In binary, the number itself shows us the answer. Using any other base is considerably more “work”, as shown in the image below, and we know this because 2 is the first (pure) primary number and, therefore, the first root of all following numbers (in the binary system). Were there a more efficient system other than *something* and *nothing*, that would be the system reality would be based on because that would be the way energy moves.

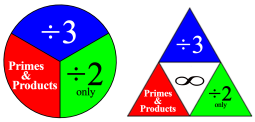
Base 2		
10000000	128	2^7
1000000	64	2^6
10000	16	2^4
10	2	2^1
1	1	2^0
11010011	**211**	

Base 3			
20000	162	$3^{4.630929754}$	$2^1 \times 3^4$
1000	27	3^3	3^3
200	18	$3^{2.630929754}$	$2^1 \times 3^2$
10	3	3^1	3^1
1	1	3^0	3^0
21211	**211**		

Base 5			
1000	125	5^3	5^3
300	75	$5^{2.682606194486}$	$3^1 \times 5^2$
20	10	$5^{1.43067655807339}$	$2^1 \times 5^1$
1	1	5^0	5^0
1321	**211**		

Base 7			
400	196	$7^{2.71241437421604}$	$2^2 \times 7^2$
20	14	$7^{1.35620718710802}$	$2^1 \times 7^1$
1	1	7^0	7^0
421	**211**		

We can easily divide all numbers into 2 groups of odd and even. How do we create 3 equal groups for all numbers? This is done in the thologram (and explained in the *Appendix C, "Tholonic Math: Prime Numbers"*), and those groups are:



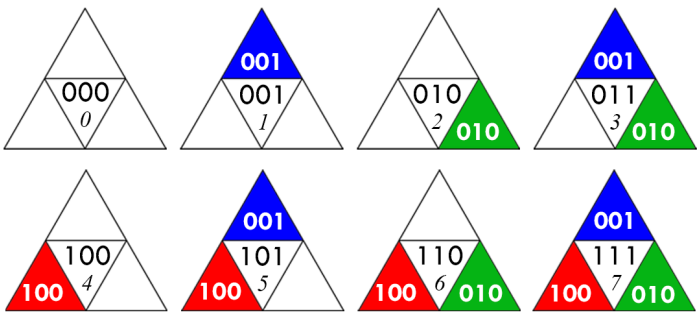
- All numbers divisible by 3 (33.3333…%)
- All numbers divisible by 2 exclusively, i.e., excluding the previous numbers divisible by 3 (33.335%)
- All prime numbers and products of primes numbers, excluding the previous prime numbers of 2 and 3 (33.3317%)

We now have 3 groups of equal size that can describe every number's type, and by assigning each group to a side of the tholon, we can see some fascinating patterns (see appendix).

In the same way, for the values 0-7, we can assign a 0 or a 1 to each of the 3 sides to describe each value with the 3 sides of the tetrahedron (shown below for numbers 0-7). We can only use the values 0-7 as they are the only values that require only 3 places

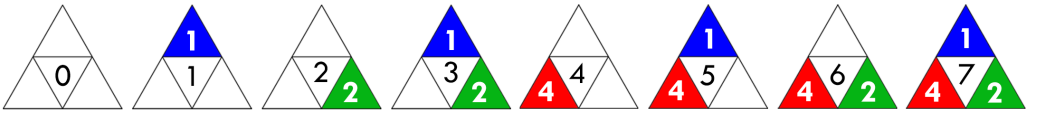
000→*0* 001→*1* 010→*2* 011→*3* 100→*4* 101→*5* 110→*6* 111→*7*

So, using the sides of a tholon only, we can hold 8 values (the center trigram of the tholon holds the total value). This organically makes the tholon a base-8, or *octal*, number system, which is the same base used in all digital processing.

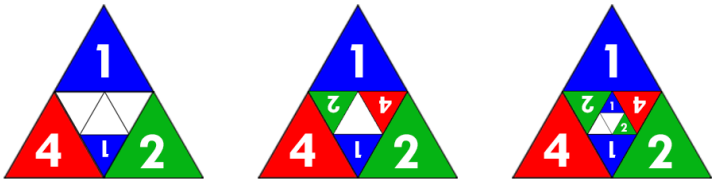


*Note: To avoid confusion between the bases, octal numbers greater than 7 are preceded with an "**o**"*

That's fine for 0-7, but what about larger numbers? What about the number 8? As this is octal, there is no 8, per se, as 7 is the largest single value that exists, so 8 in octal is written as *o*10, which is the same as *o*010 which is the same as *b*1010. We can't fit 4 values to 3 sides, but we can refer to the parent tholon representing *b*111, which is 7. Below is the same chart as above but using octal numbers instead of binary.



How, then, do we notate *o*10? As we already have a 7, which is a parent tholon, we only need to add a child tholon that has a value of 1, as shown in the left-most image below:



8
*o*10
*b*1010

14
*o*16
*b*1110

17
*o*21
*b*10001

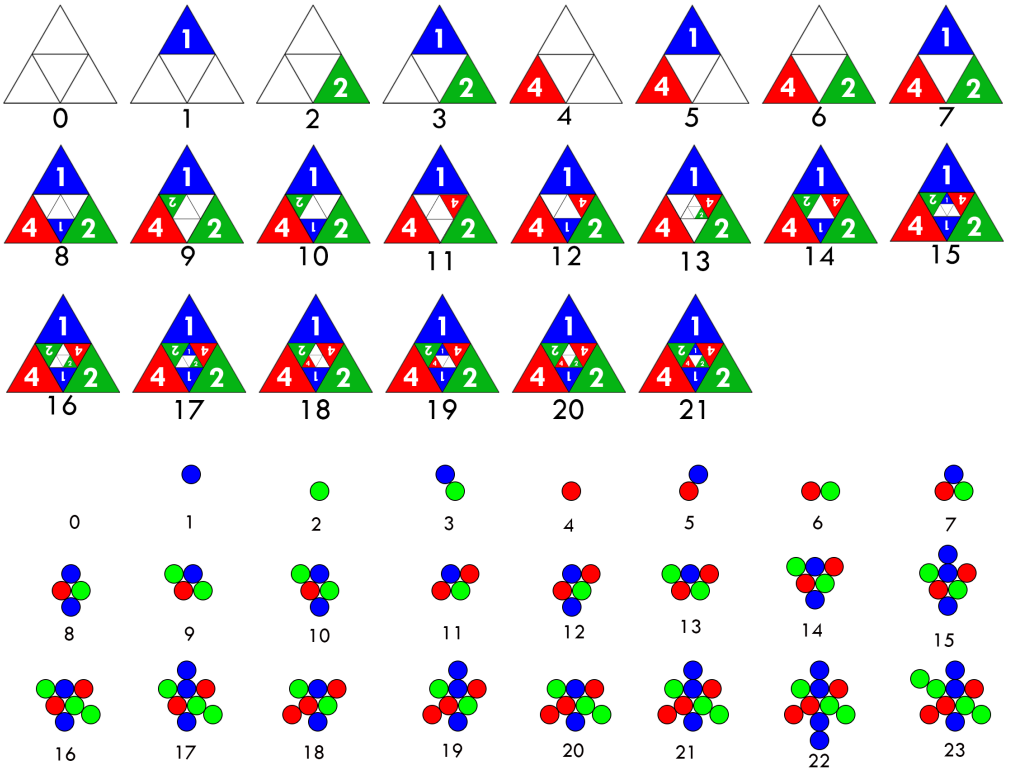
The center image above shows the same technique for 14 (7+7) and the right image for 17.

As you can see, this is not a very human-friendly way to count, especially when we get to numbers like 300,000,000. We'd have to start with a trigram that stretched from Istanbul to New York City to be able to read the last trigram. Fortunately, the point of this is not to introduce a terrible way to add (although if the Department of Education wants to give me billions of dollars to develop their *NEW New Math* program, please get in touch with me), but to show the fractal nature of numbers. It also shows how numbers act like energy in the same way we demonstrated above with the number towers because a trigram must be filled before a new trigram is added. Finally, it shows that, at least tholonically, there is an optimum set of *parton* numbers that creates a *holon* value; 7+7+3 = 17 is more optimal than 2+3+5+7, and in the tholonic system, it would not even be possible to notate that because the tholonic system organically only permits the most optimum set.

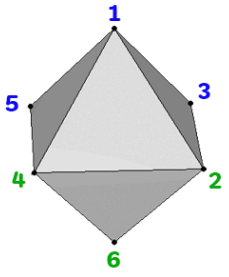
Further on, we will see how this same tholonic process is why cells and organs come together optimally.

You probably already know, or figured out, that using base-2 numbers limited to 3 places results in a base-8 system because $2^3 = 8$, but the less obvious implication is that the sides of the tholon can act exponentially to whatever is applied to them.

Just for fun, here is what the same process above looks like if we start at the center, move outward, and then change the trigrams to circles.

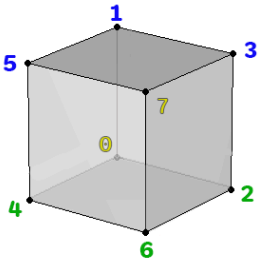


An interesting example of how the same patterns appear across different scopes is how the *xyz* coordinates of the tetrahedron, cube, and octahedron relate to these binary values. For example, in the image below, we can see that the simplest *xyz* coordinates for each shape have a pattern, which is then expressed in 1s and 0s. If we interpret those 1s and 0s as binary values, we can convert them to a decimal value and then map that value to the 3D location of a point.



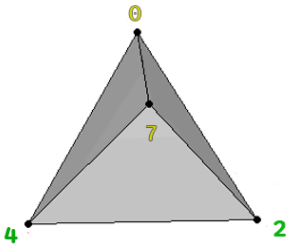
Octahedron

coords	*bin*	*dec*	
0,0,2	001	1	
0,2,0	010	2	
2,0,0	100	4	
0,0,2	001	6	(7-1)
0,2,0	010	5	(7-2)
2,0,0	100	3	(7-4)



Cube

coords	*bin*	*dec*
1,1,1	000	0
1,1,1	001	1
1,1,1	010	2
1,1,1	011	3
1,1,1	100	4
1,1,1	101	5
1,1,1	110	6
1,1,1	111	7



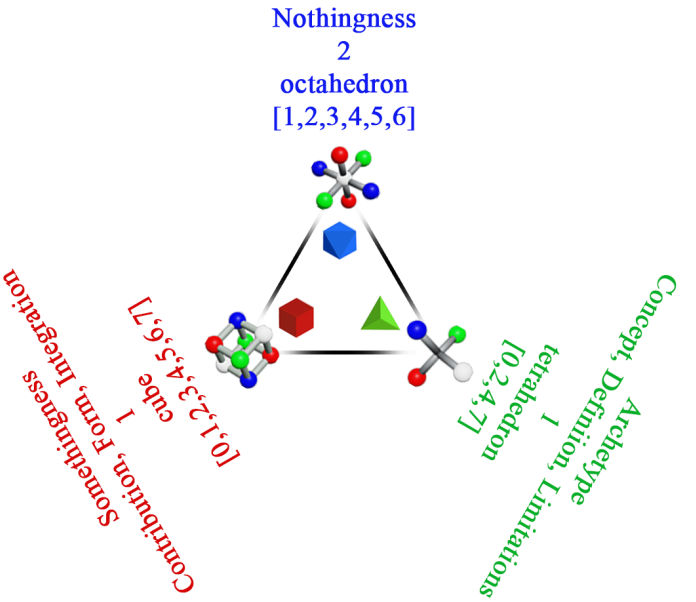
Tetrahedron

coords	*bin*	*dec*
1,1,1	111	0
1,1,1	010	2
1,1,1	100	4
1,1,1	111	7

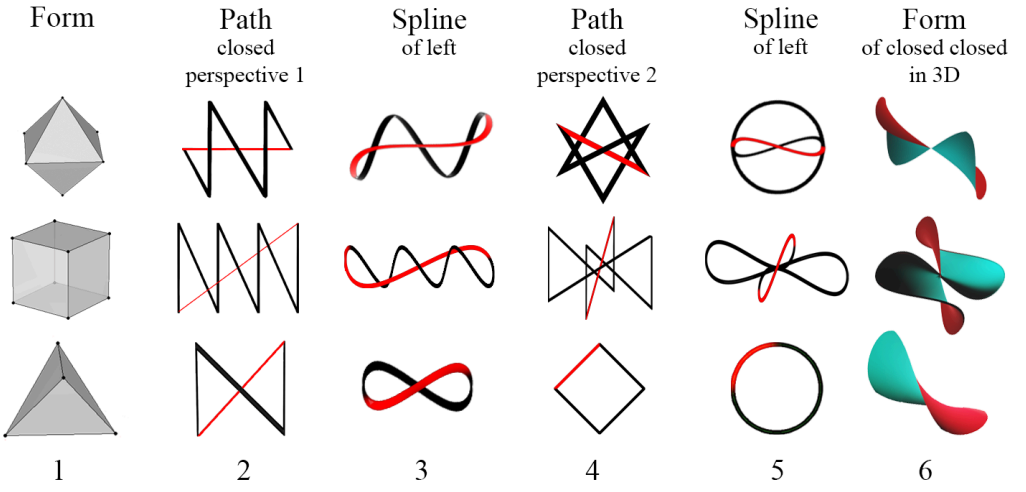
Note: Negative values are in red, odd values in blue, and even values in green. 0 is yellow, as it has both odd and even qualities.

There are several interesting relationships, but especially interesting is the octahedron because, to ensure all the coordinates are integers, we have to use 2 as the dimensions of the sides, unlike how we have to use 1 for the other shapes.

This is an interesting details to add to the pattern, which now looks something like:



What this coordinate values also show us is that each point has a qualitative value and order, which tells us there is a direction, which looks like this, respectfully:

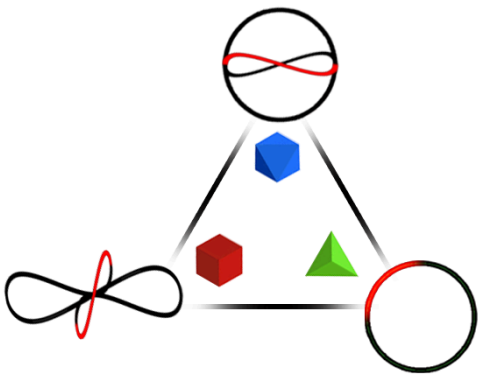


The *Paths* represent the *closed form* we get when we connect the vertices in their binary order. 1 can only connect to 2, 2 to 3, etc. It is a *closed path*, or *closed form*, because when we get to the last point, we connect it to the 1st point (indicated in

red). An *open path* occupies 3D space but is itself only 1 dimensional and cannot define a 2D or 3D form. Columns 2 and 4 show closed forms. Columns 3 and 5 show these closed forms after that have been transformed via *bi-cubic uniform B-splines* (*Catmull-Clark* algorithm, specifically), which is intended to show the most probable flow of energy, using the vertices of the original forms as control points. Whether or not this is the most accurate way may be debatable, but regardless, we see some fascinating patterns, such as in Column 5. Also interesting is how in *Col 2/3*, we see the tetrahedron produces 1 "saw-tooth" form of a cycle, the octagon produces 2 cycles, and the cube produces 3 cycles. All these images are orthogonal projections of 3D shapes onto 2D space, so these cycles are not actually cycles but just appear as cycles. However, the same could also be said about our 3D cycles of light, energy, sound, etc., if we consider them as 3D projections of a multidimensional source.

Column 6 shows a colored 3D version of the original form when the vertices are connected in their binary order and can be considered archetypes of the 3D forms in *Column 1* because the binary paths are simpler than the 3D shapes they create. It's worth pointing out that Col 6/tetrahedral is a *hyperbolic paraboloid*, which most of us know as the shape of a Pringles potato chip. The Pringles shape (and the canister to hold them) was designed by Fredric Baur, an organic chemist and food storage scientist who was keenly aware of the hyperbolic paraboloid's remarkable durability. This shape is familiar in architecture for the same reason, especially in the military and for roofing. So, the next time you get to the bottom of a Pringles can and the last chip is still intact, you can thank the tetrahedron.

If we apply these forms to the trigram, we get the following:



There is another relationship between these forms that is worth looking as well, but we will want to look at all 5 Platonic solids for this.

We can add the degrees of the angles of each of these forms to get their total number of degrees. For example, a tetrahedron is made of 4 triangles and each triangle as 3 angles of 60°, so 60×3×4 = 720. Applying this to all the platonic solids we get: tetrahedron = 720°, octahedron = 1440°, cube = 2160°, icosahedron = 3600°, dodecahedron = 6480°, and totaled all together = 7920°.

As a reminder…

- **Tetrahedron**: 4 faces of triangles (@ 60°×3=180°)

- **Octahedron**: 8 faces of triangles (@ 60°×3=180°).
- **Cube**: 6 faces of squares (@ 90°×4=360°)
- **Dodecahedron**: 12 faces of pentagons (@ 108°×5=580°).
- **Icosahedron**: 20 faces of triangles (@ 60°×3=180°).

You can see they that are all a perfect multiples of 10 of commonly known values, but more interesting is that they have the same relationship to each other as the numbers 1, 2, 3, 5, 9, 11.

	Tetra	Octa	Cube	Icosa	Dodec	TOTAL
	720	**1440**	**2160**	**3600**	**6480**	**7920**
Tetra	**720**	**1**	**2**	**3**	**5**	**9**	**11**
Octa	**1440**	0.50	**1**	1.50	2.50	4.50	5.50
Cube	**2160**	0.33	0.67	**1**	1.67	**3**	3.67
Icosa	**3600**	0.20	0.40	0.60	**1**	1.80	2.20
Dodec	**6480**	0.11	0.22	0.33	0.56	**1**	1.22
TOTAL	**7920**	0.09	0.18	0.27	0.45	0.82	**1**

	Tetra	Octa	Cube	Icosa	Dodec	TOTAL
	1	**2**	**3**	**5**	**9**	**11**
Tetra	**1**	**1**	**2**	**3**	**5**	**9**	**11**
Octa	**2**	0.50	**1**	1.50	2.50	4.50	5.50
Cube	**3**	0.33	0.67	**1**	1.67	**3**	3.67
Icosa	**5**	0.20	0.40	0.60	**1**	1.80	2.20
Dodec	**9**	0.11	0.22	0.33	0.56	**1**	1.22
TOTAL	**11**	0.09	0.18	0.27	0.45	0.82	**1**

As well, every total number when divided by 60 = 12. This might lend a clue as to why we have 60 minutes in two 12 hour periods to define a day, as per the ancient Babylonian system that our time system is based on.

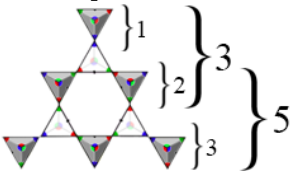
Now, here is some crazy coincidence… the mean diameter of the Earth is 7920, the total of all the angles of the platonic solids, and the mean diameter of the Moon is 2160 miles, the angles of the cube! What's really crazy about this coincidence is that the mile was a totally arbitrary length that started out as 1000 paces of a Roman soldier, so we would never suspect that a human's pace would relate to planets sizes… but they do because the same patterns that create the platonic solids, are the patterns that create the planets, and life. Contrary to accepted history, the base 10 counting system (which the 1000 paces is based on) is not because humans have 5 fingers on 2 hands. Humans have 5 fingers and 2 hands because 5 x 2 is one of those fundamental patterns that we see on all of life, and the base 10 *is* the most efficient system of counting simply because 0-9 is the most contiguous set of values that can be defined with 2 trigrams.

"Arbitrary" is like "coincidence"… neither actually exists.

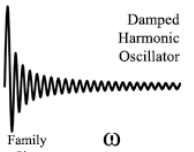
We can also see that the dodecahedron is the only form that is the perfect multiple of 3 of the cube, which is itself a perfect multiple of 3 of the tetrahedron, and if we add the degrees of these 3 forms, we get 9360, which is the degrees of the tetrahedron, or 720, × 13.

And this finally brings us back to …

With all that said, let's return now to the tholonic formulas for π, which are based on the Leibniz model for π. This model provides a way to measure the difference between each generation of tholons. While Leibniz used odd numbers, the tholonic perspective is to consider the generations of tholons because the thologram is a model of creation, growth, and the movement of energy from an originating point (the parent tholon) to a destination point (the child tholon). As such, we are using the size of each sequential pair of parent and children, or *family* of tholons, i.e., 1 tholon generates 2 (*real*) child tholons, hence, a *family* of 3. These 2 child tholons generate 3 children for a *family* of 5 (*real*) tholons, etc. The quantitative values are the same in both equations, but the qualitative values are radically different. For the record, while we are calling them a *family*, technically, they are more like siblings as they were all created in the same generation and by the same parent. Still, there is a natural hierarchy within this generation simply by their positioning relative to one another.



In applying formula ***b)*** we begin with ***4÷family-size*** for the first tholon, so we have ***4÷1***, or simply ***4***. The next value, with a *family-size* of 3, would then be ***4÷3***, or ***1.333***, the next *family-size* of ***5*** is then ***(4÷5),*** or ***0.8***, etc. Then we combine millions of these values, ***4 - 1.333 + 0.8 -***…, to arrive at **Ω**. Not surprisingly, this series of values creates a pattern of a *damped harmonic oscillator* (top, image right), an oscillation that gets reduced due to energy being drained from a system. Of course, in this case (and all cases), the energy is not being "drained" but rather distributed. This progression goes on forever, with ever-decreasing amplitude.



Family Size	ω Value
1	4
3	1.33333333333333000
5	0.8
7	0.571428571428571000
9	0.444444444444444400
11	0.363636363636363600
13	0.307692307692308000
17	0.235294117647059000
19	0.210526315789474000
21	0.190476190476190000
23	0.173913043478261000
25	0.16
27	0.148148148148148000
29	0.137931034482759000
31	0.129032258064516000
117	[illegible]
119	[illegible]
121	0.033057851239669
123	0.032520325203252000
125	0.032
127	0.031496062992126000
129	0.031007751937984500
131	0.030534351145038200
617	[illegible]
619	[illegible]
621	0.006441223832552
623	0.006420545746388440
625	0.0064
627	0.006379585325953750
629	0.006359300476947540
631	0.006339144215530900
3117	[illegible]
3119	[illegible]
3121	0.001281640499833
3123	0.001280819724623760
3125	0.00128
3127	0.001279181323952670
3129	0.001278363694471080

What jumps out are the perfect, or exact, values for **ω** that only appear for *family-sizes* that are 5-based (image right, in yellow), and the fact that these values are progressing in binary order; 8, 16, 32, 64, … or 2^3, 2^4, 2^5… but at the same time is divided by 10 (or in terms of prime numbers, 2×5) at each level, as they appear as 0.8, 0.16, 0.0032. While reality is often fuzzy, measured in degrees of truth, these binary values are absolutely exact, and they are the only exact values that appear. It's also interesting that in this example, the growth of the thologram results in smaller and smaller values, just like the size of the tholon gets smaller and smaller in the binary counting example… which I guess is what we would expect if the thologram was internally expanding, but I wonder if there is a correlation.

In this example, the mathematical reason for this is that 1 can only be divided by numbers created by 2 and 5 (i.e., 2, 4, 5, 8) to produce an exact value. Still, as our *family-size* will always be an odd number, only numbers created by 5 will produce exact values. The more curious result is their continuous shrinking by a factor of 10 at each occurrence. To be clear, the very same thing happens with the other values, the difference being that only 5-based values produce an exact rational number. These 5-based values also integrate the base-2 binary and base-10 number systems perfectly.

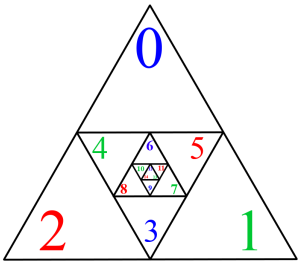
Instance (n)	Generation 4/ω	Pattern	Value ω	$\omega = \frac{2^{n+2}}{(2\times5)^n}$ or	$\frac{2^n\times2^2}{(2\times5)^n}$ or	$\frac{2^n\times4}{10^n}$ or	$\frac{2^n\times4}{(2\times5)^n}$	Patterns and instances
0)	1	5^0	**4**	$2^2/(2\times5)^0$	$2^0\times2^2/(2\times5)^0$	$2^0\times4/10^0$	$2^0\times4/(2\times5)^0$	1×4/1
1)	5	5^1	0.**8**	$2^3/(2\times5)^1$	$2^1\times2^2/(2\times5)^1$	$2^1\times4/10^1$	$2^1\times4/(2\times5)^1$	2×4/10
2)	25	5^2	0.**16**	$2^4/(2\times5)^2$	$2^2\times2^2/(2\times5)^2$	$2^2\times4/10^2$	$2^2\times4/(2\times5)^2$	4×4/100
3)	125	5^3	0.0**32**	$2^5/(2\times5)^3$	$2^3\times2^2/(2\times5)^3$	$2^2\times4/10^3$	$2^3\times4/(2\times5)^3$	8×4/1,000
4)	625	5^4	0.00**64**	$2^6/(2\times5)^4$	$2^4\times2^2/(2\times5)^4$	$2^4\times4/10^4$	$2^4\times4/(2\times5)^4$	16×4/10,000
5)	3125	5^5	0.00**128**	$2^7/(2\times5)^5$	$2^5\times2^2/(2\times5)^5$	$2^5\times4/10^5$	$2^5\times4/(2\times5)^5$	32×4/100,000
6)	15625	5^6	0.000**256**	$2^8/(2\times5)^6$	$2^6\times2^2/(2\times5)^6$	$2^6\times4/10^6$	$2^6\times4/(2\times5)^6$	64×4/1,000,000
7)	78125	5^7	0.0000**512**	$2^9/(2\times5)^7$	$2^7\times2^2/(2\times5)^7$	$2^7\times4/10^7$	$2^7\times4/(2\times5)^7$	128×4/10,000,000
8)	390625	5^8	0.00001**024**	$2^{10}/(2\times5)^8$	$2^8\times2^2/(2\times5)^8$	$2^8\times4/10^8$	$2^8\times4/(2\times5)^8$	256×4/100,000,000

On closer examination, we discover the relationship between 2 and 5 is very close and can be seen in their simple relationships $\frac{1}{5} = 0.2$, $\frac{1}{2} = 0.5$, $\frac{2}{5} = 0.4$ or $\frac{1}{5} \times (2 \times 5)$, $\frac{5}{2} = 2.5$, plus the more elaborate $\frac{2\times5+\frac{2}{5}}{2} = 5.2$. 5 and 2 just can't get enough of each other, and given that 5 just happens to be $\frac{1}{2}$ of 10, which is the base of our number system, this 2/5 relationship is even more apparent.

There are solid arguments why base-12 or base-8 is superior to base-10, so why do we use base-10? The common argument is because that was the base system that was in common use when the Indians/Arabs introduced the popular place-holding system, and base-10 is presumed to have originated from our having 5 fingers, just as the Mayan base-20 comes from fingers and toes (making counting a form of exercise, I would imagine), and the base-8 of the Yuki tribe from California from counting the spaces between their fingers. Although, for many, 10 was a sacred number, which we can see in the divine languages Arabic, Hebrew, and Sanskrit, all of which were heavily biased toward base-10. "Divine" refers to the belief that these languages were believed to be delivered by God. Sanskrit, called the "Language of the Gods", is said to have been created by God before he created the Universe. Hebrew comes from the Torah, which is said to be "given by God" and "was made of an integument of white fire, the engraved letters were in black fire, and it was itself of fire and mixed with fire, hewn out of fire, and given from the midst of fire"[345]. Arabic is said to be the language God revealed in the final revelation of the Quran. What is important here is not whether they were of divine origin but that the people believed they were.

In addition to the base-10 bias, the number 10 had specific significance, for example, the 10 commandments, 10 plagues, Jesus' use of 10 in many parables, 10% tithing, etc. In the Hindu *Vedas*, which date back 7,000 years, the numbers 1, 3, 7, and 10 are most used and are considered the most sacred of numbers, with 10 also being symbolic of "many" and "fullness" and is (perhaps) why the Rig Veda (ancient Indian collection of Vedic Sanskrit hymns) is 10 volumes[346]. In the Islamic Hadith, Mohammad states that good deeds are returned 10-fold. These are just some of the many examples of the significance of 10 that came from the dominant and unquestionable cultural influence at the time when modern math was being invented.

For this reason alone, we would expect the Hindu-Arabic and Judeo-Christian number systems to be base-10 because that is what their respective gods gave them. Even if a better number system existed, no one was keen on committing heresy by pointing that out. We can easily imagine how base-10 counting made its way into these sacred texts if we presume that their origins, although perhaps divinely inspired, were written by men with 5 fingers on 2 hands.



Excerpt from "*Appendix C: Tholonic Math*". See for more details.

However, the tholonic view is that we have 5 fingers and 2 hands because the 2/5 relationship defines a fundamental pattern in nature. This is common among most species of mammals and exists in many birds, fish, and insects, going back to the ancestor of all mammals, reptiles, amphibians, and birds, the *pentadactyl tetrapods* of the Devonian Age 400,000,000 years ago (*pentadactyl* mean "having 5 fingers", and *tetrapod* mean "four-limbed vertebrate animals"). This is solid evidence that this 2/5 relationship is a very efficient pattern; otherwise, evolution would not have stuck with it for 400,000,000 years, at least where tetrapods are concerned. It would be natural, then, that we would use a base-10 system. But why 2 and 5? Because they are the values, the forms of energy, that are both in the domain of *Contribution/form*, i.e., interaction and integration with the environment, and both values represent the opposing sides of the same axis, as 5 is the "complement", and in a way, the "opposite" of 2. This is because the 1st generation of 2, i.e., the 1st "child" of 2, is 5, just as the child of 1 is 4, and most telling, the child of 0 is 3. In the thologram, 0, 1, and 2 are points, and their children of 3, 4, and 5 (each child is always +3 of the parent.), are lines, and *their* children are points, and so on. The natural pairing becomes that of parent and child or a point and a line.

This may sound like "numerology" or some other form of irrational symbolism and superstition, but it is based on the movement of energy, which we claim numbers represent as they must follow the same laws of energy. As for the 5-finger phenomena, the traditional explanation from the Leading experts in the field of human anatomy, developmental biology, and evolution goes something like this:

> *"... we simply don't 100% know the 'why' or 'how' of the narrowing of hand morphology to five digit rays in the Devonian. [Any hypothesis] would be highly speculative without a lot of data on the types of selective pressures organisms at the time were facing...* 347

The tholonic explanation provides a very "real" answer, and by applying the rule of science, which says "something is real when it is a necessary ingredient of a theory that correctly describes what we observe", these qualitative powers of numbers are as "real" as the never-actually-seen black holes and quarks.

Interestingly, we see a similar pattern of the *Contributing* 2/5 pair in the other *Defining* pair of 1/4:

$\frac{2}{5}$= 0.4 and $\frac{5}{2}$ = 02.5 *Contributing* pole

$\frac{4}{1}$ = 4.0 and $\frac{1}{4}$ = 0.25 *Defining* pole

This suggests that the spectrum where new N-states appear can be seen as an octave or a magnitude of difference between the poles, as the *Contributing* 0.4 is one octave higher than the *Defining* 4.0 whose 0.25 is an octave lower than the *Contributing* 2.5. This creates an octave of the size of 3.75, or (3×4)+$\frac{3}{4}$, or perhaps more relevant, 15

parts of $\frac{1}{4}$ or $\frac{15}{4}$. Equally interesting is how the 1st N-state = 0 (i.e., $\frac{0}{3}$), but the 2nd N-state = 0.5 (i.e., $\frac{3}{6}$), right smack in the middle of the *nothingness* and *somethingness* of 0 and 1, which is what we would expect as the 1st trigram only defines the boundaries of the children and is not itself a child. The children, which are the tholons that instantiate and exist *within* the 1st tholon, only begin *after* the first trigram.

The natural number system in the thologram appears to be binary, so binary math and binary logic are probably the most applicable for tholonic calculations. If all creation exists within the thologram, and the thologram is binary in nature, then this might lead to some insights into the "reality is a simulation" hypothesis.

Note: More on the significance of the number 5 in the section of this appendix titled "Prime Numbers".

1,2,3, Points and Lines

In a 6-generation bifurcating tree, we have a total of 63 points, as we start with 1 point that splits into 2 points 6 times, so 20+21+22+23+24+25 = 1+2+4+8+16+32 = 63. The connecting lines of each parent-child relationship begin at 2, so 21+22+23+24+25 = 2+4+8+16+32 = 62.

If we look at these two numbers, 63 and 62, we find a fascinating pattern that is perfectly mathematical that is typically tossed aside as a mere curiosity.

All combinations of 1, 2, 3	Base 10 (decimal)	Base 8 (octal)
1,2,3	63=21×3 (points) 62=31×2 (lines) } 125=5×5×5	77=25×3 (points) 76=37×2 (lines) } 175=5×5×5
1,3,2 2,1,3	36=12×3 = 2^2×3^2 63=21×3 = 7×3^2 } 99=11×(3×3)	44=14×3 = 2^2×3^2 77=25×3 = 7×3^2 } 143=13×(3×3)
2,3,1 3,1,2	26=13×2 62=31×2 } 88=11×(2×2)	32=15×2 76=37×2 } 130=13×(2×2)
3,2,1	23=23×1 32=32×1 = 2^5×1 } 55=11×(2+3)	27=27×1 40=40×1 = 2^5×1 } 67=13×(2+3)

Both numbers are created by the numbers 1, 2, and 3. If we look at the products created by these 3 numbers, among other interesting details, we see that the 'point-based' numbers are multiples of 3, and the line-based numbers are multiples of 2. There is also a 3rd set of numbers (23 & 32) with no multiples; of these, 23 is the only number that is both prime and has no multiples. 23 is the 9th prime number (or 10th if, like Euler, you consider 1 a prime number). Most interesting is that all the sums of each subset of numbers is a multiple of 11 (the 5th or 6th Euler prime number), and all the number totaled is 53.

What does this tell us when we consider that points are 0-dimensional non-existent concepts only, and the relationships between these non-existent concepts are 1-dimensional lines? Among other things, it tells us that anything with a dimension (i.e., everything that exists) results from a relationship, suggesting that reality is the relationship between 0-dimensional non-existent concepts.

Even though there are some patterns when we do that same calculation in base-8/octal, it is base-10 only that shows the most interesting patterns.

Appendix D: Greek Gods

You wouldn't want to bump into them in a dark alley

According to Greek mythology, the world began with several primordial beings who begat some gods, who then begat even more gods, and so on. What follows is a brief overview of that begetting and the cosmic drama that typically follows the begetting of gods.

To get a general idea of where these gods lived in the psyches of the flock, here is a concept-cloud based on the gods, the attributes they personified, and where they stand in the hierarchy of divine authority.

(The following is a slightly modified transcript reprinted with permission from "The Life Guide" YouTube channel (https://www.youtube.com/c/TheLifeGuide), entitled "Greek Gods Explained In 12 Minutes".)

First came **Chaos**. Then **Gaia**, Earth. From **Gaia** then came **Uranus**, heaven, who together created the **Titans**. And finally, **Eros**, love.

Uranus disliked his children and locked them deep within the Earth. **Gaia**, sick of having her children imprisoned, made a great sickle that she gave to her son **Cronus**. **Cronus** hid until Uranus came to lie with his mother, then leaped out and sliced off his father's genitals, which fell into the sea. **Cronus** proceeded to release his fellow **Titans** from prison, and thus the age of the **Titans** began.

Cronus married the **Titan Rhea**, who gave birth to most of the major gods. **Cronus**, scared by a prophecy that his children would take his power, imprisoned them as soon as they were born, swallowing them whole. **Rhea** pleaded to **Gaia** for help, who took pity and hid **Zeus** after he was born on Mount Ida in Crete. When **Cronus** came to eat his son, **Rhea** fed him a stone instead, tricking the **Titan**.

Gaia raised **Zeus** until he was strong enough to take on his father. The two fought, and upon defeat, **Cronus** was forced to release **Zeus's** siblings, starting the war between the gods and the **Titans**. The war lasted 12 years until **Zeus** freed the **cyclopes** and the **Hundred-Handed Giants** whom **Cronus** had imprisoned. The **Cyclopes** gifted **Zeus** his famous thunderbolt, **Poseidon** his trident, and **Hades** a Hat of Darkness, tipping the balance of battle.

The **Titans**, defeated, were thrown into **Tartarus**, a prison deep within the underworld. And so started the reign of the gods. **Zeus**, **Poseidon**, and **Hades** decided to share power, drawing lots to decide where they would rule over. **Zeus** got the sky, **Poseidon** the seas, and **Hades** the dead.

Zeus, king of the gods, ruled from his throne on Mount Olympus, home of the immortals, often using his symbols of the thunderbolt and eagle to warn or encourage mortals. **Zeus** was responsible for all weather changes, from lightning to snow, depending on his mood. He was also a protector of the home and strangers, meaning being a bad host could land you in deep trouble. **Zeus** married his sister **Hera**, who birthed the gods **Ares** and **Hephaestus**.

Zeus was also infamous for his many affairs with other goddesses from which **Athena**, **Hermes**, **Apollo**, **Artemis**, and **Persephone** came. He also engaged in many affairs with mortal women, where he created the god **Dionysus** and many heroes like **Perseus** and **Hercules**, most of whom experienced the wrath of the jealous **Hera**.

Poseidon, one of the most powerful gods, ruled the sea, created earthquakes, and was the god of horses, much prized in ancient society. He had a palace on Mount Olympus, but an even more magnificent one under the sea where he spent most of his time. Sailors would have to pray to **Poseidon** and offer sufficient sacrifice, otherwise risking a painful death at sea. It was very unwise to cross **Poseidon** as he held a grudge and could deal out very harsh punishments.

In the story of **Theseus** and the **Minotaur**, **King Minos** rules over the island of Crete. Every year he sacrificed his best bull to **Poseidon**. One year, he withheld his favorite bull, a huge white animal. **Poseidon** noticed, but instead of punishing **Minos** directly, he decided to target his wife. He made her fall in love with the bull, which eventually led to the birth of the half-man, half-bull creature called the **Minotaur**.

Hades, the oldest of the brothers, ruled over the underworld where the spirits of the dead resided. He shared his throne with his wife, **Persephone** and the two were considered to be gods of fertility. The underworld had several guardians and trials, making it difficult for the dead and near impossible for the living to enter. The gates lay past the deadly river **Styx**. The only way to enter was to get passage from the

ferryman, **Charon**. **Charon** required payment, which is why Greek burials included placing coins on the eyes of the deceased. If the soul could not afford to enter, they were fated to wait forever on the shores of the **Styx**.

Past **Charon** lay **Cerberus**, the fabled three-headed dog who guards the underworld gates. Ultimately, the soul will reach the three judges of the underworld, who decide where it should go. They can choose **Elysium**, the Fields of **Asphodel**, or **Tartarus**. **Elysium** is akin to heaven, a peaceful place where the souls of heroes, demigods, and especially good mortals reside. The **Asphodel Meadows** is the place for ordinary folk who did not achieve anything notable in life, good or evil.

Tartarus is very similar to Hell and contains not only the **Titans** but also criminals who upset the gods and are tortured for eternity. **Hera**, sister and wife of **Zeus**, and queen of the Gods, was the protector of marriage and women. She was deeply respected in Greek society. She was one of the most vengeful and spiteful gods, punishing women who lay with her husband and any subsequent children. When **Leto** was pregnant with **Apollo** and **Artemis**, Hera stopped her from giving birth. She kept **Io**, another of **Zeus's** mistresses, as a heifer and had her guarded by the hundred-eyed monster, **Argos**.

A famous tale of her jealous vengeance is the story of **Hercules**. **Hercules** was an illegitimate child of **Zeus**. **Hera** sent serpents to kill the future hero when he was just a child, but the demigod crushed the creatures with his bare hands. She later drove him to madness, making him kill his wife and children, the event that sent him on his 12 labors.

Athena, goddess of wisdom and war, the child of **Zeus** and **Metis**, was not born in a conventional way. **Zeus** received an omen that their children would take the throne from him and so swallowed **Metis** while she was pregnant. After this, **Zeus** began to get a terrible headache. He asked a fellow immortal, thought to be **Hephaestus**, to split his head open with an ax. **Athena** was then born from his forehead, jumping out in full battle gear while letting out a war cry.

Athena had an affinity for heroics, coming to the aid of heroes like **Perseus** and **Hercules**. Her favorite was **Odysseus**, who she worked hard to keep safe so he could return to his homeland. **Athena** was highly revered in Athens, which was named after her. She competed with **Poseidon** for the city, both of whom attempted to give it the best gift. **Poseidon** struck the ground with his trident, making a water stream rise. **Athena** kicked the Earth and caused the first olive tree to emerge. The gods deemed **Athena** victorious, and the city took her name. **Athena** was also one of the sacred virgin goddesses, and so in her honor, the temple built on the Acropolis in Athens was named the **Parthenon**, which comes from **Parthenos**, meaning "the virgin".

Ares was the bloodthirsty and cruel god of war. Neither god nor mortal particularly liked **Ares**. The warfare he represents is not honorable nor heroic, but rather the primal rage and bloodshed of the battlefield. **Ares** had a relationship with the goddess **Aphrodite** who was married to the god **Hephaestus**. The two would sleep together whenever her husband was away. When **Hephaestus** found out, he made an invisible net, hung it over his bed, and told his wife he was going away. He hid, and as soon as **Ares** and **Aphrodite** got into bed together, they were trapped in the net and unable

to move. **Hephaestus** called upon all the gods, inviting them to see the two naked immortals trapped in the net. Laughter burst out everywhere, and it was only due to the intervention of **Poseidon** that they were released.

Aphrodite was the goddess of beauty and love, responsible for sexual attraction in both mortal and immortal alike, often using her powers for amusement. Accounts of her birth vary, with her either being born from the genitals of **Uranus** or as another illegitimate child of **Zeus**. **Aphrodite** had a pivotal role in the **Trojan War** when Prince **Paris of Troy** was tasked with giving an apple to the fairest goddess. **Hera**, **Athena**, or **Aphrodite**, each promising him something different in return. **Paris** chose **Aphrodite**, who promised him the most beautiful woman in the world, **Helen**. **Helen** was married to the king of **Sparta**, **Menelaus**. **Aphrodite** put Helen under a spell when **Paris** came to visit **Sparta**, making her run away with him. **King Menelaus** and his brother **Agamemnon** raised a massive army to go take **Helen** back from **Troy**, and so started the **Trojan War.**

Goddess of the hunt and the twin sister of **Apollo**, **Artemis** was a deadly Archer and an important member of Olympus. She watched over hunters and their prey, ensuring the wilderness was kept in check. **Artemis** is also prized for her virginity and guarded it jealously. The hunter **Actaeon** once stumbled upon her naked as she was bathing. **Artemis** proceeded to change the man into a deer and set his fifty hunting dogs upon him, giving him a painful death for his mistake.

Twin brother of **Artemis**, **Apollo** was a god of many things. He was a god of archery but also light and music, seen with a lyre as much as a bow. **Apollo** is closely linked with prophecy. He was born on Delos and honored the island by setting up an Oracle there. He later traveled to Mount Parnassus and slew the great snake **Pytho**. He created a temple where he had marked the foundations for where the famous **Oracle of Delphi** would reside.

Hermes was the messenger of god, patron of thieves, and known as a trickster amongst the gods. He often pulled pranks and stole from his fellow divinities. When he came of age, he assumed the role of messenger, taking a golden rod with him as a mark of his authority. He is often seen with a winged helmet and sandals, which he used to fly around and deliver messages.

Demeter was the goddess of farming and watcher of the harvest. The one thing she prized more than anything else was her daughter, **Persephone**. It happened that **Hades** was also interested in **Persephone** as he had fallen in love with her. One day, while the girl was picking flowers, he opened up the ground and dragged her down to the underworld. **Demeter** was distraught when she found out and searched for her daughter for nine days and nights until the Sun God **Helios** revealed her captor's identity. **Demeter** locked herself indoors for an entire year, refusing to come out until **Persephone** was returned. Without the goddess of farming, the world went into famine. In order to save the world, **Zeus** ordered Hades to release **Persephone**. **Hades** had fed the girl the food of the dead, a pomegranate, meaning that she was bound to him. After much discussion, **Zeus** decided that **Hades** could have **Persephone** for three months of the year, and **Demeter** could have her for the other nine months. This explains why the winter months are cold, and the plants die as **Demeter** waits for her daughter to return.

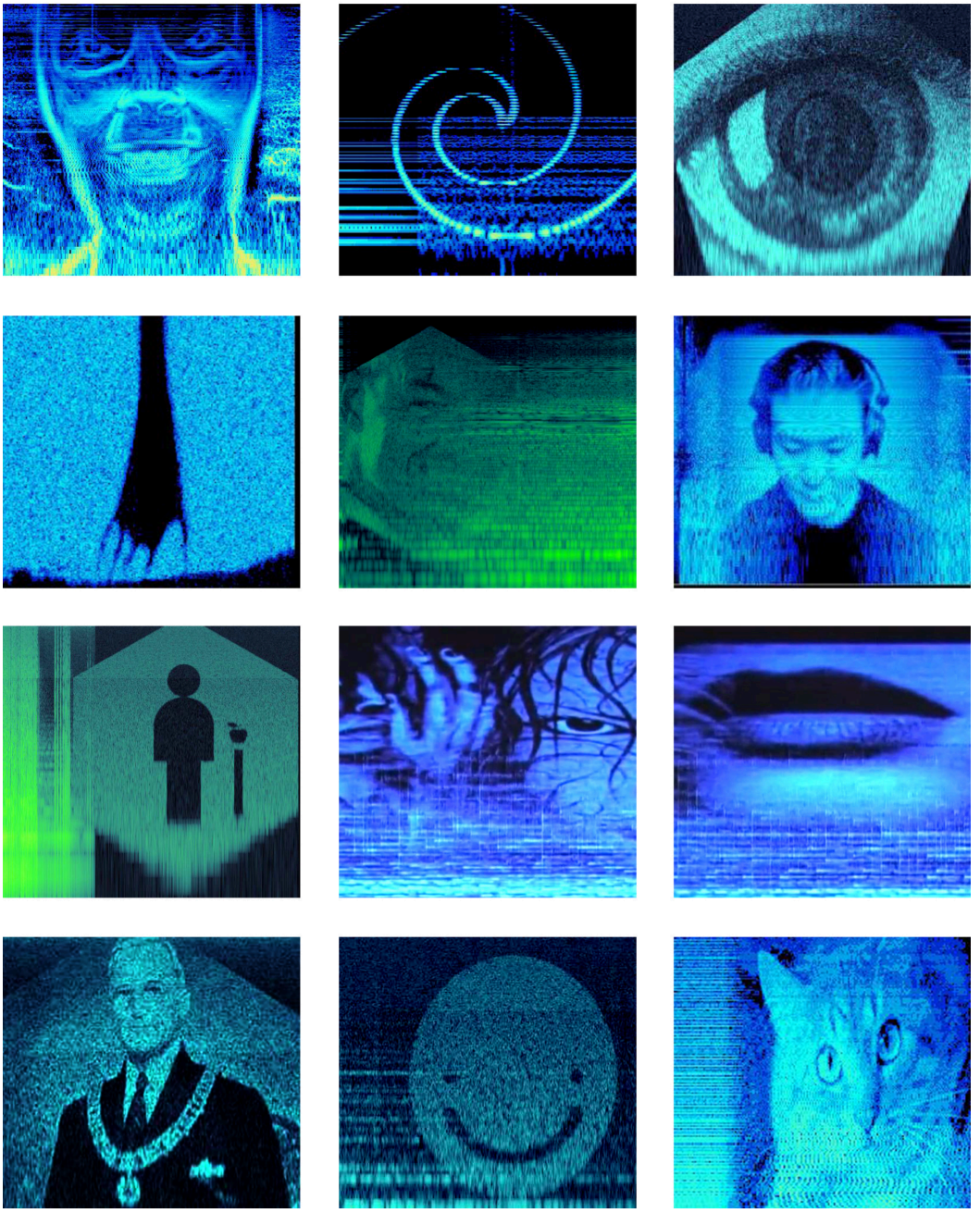
The god of smithing, **Hephaestus**, had a difficult start to life. He was born lame, so his mother **Hera** decided to throw him off Olympus into the sea to drown. He later returned to the home of the gods and was given **Aphrodite** as a wife by **Hera** to reconcile with him. He was a great inventor and fashioned many of the palaces on Olympus. He also fashioned the equipment of many heroes, such as **Achilles**, for whom he created armor and a magnificent shield.

God of wine and parties, Dionysus was perhaps the most fun of the Olympians. Frenzied women called **maenads**, and half-goat men called **satyrs** followed him. He had a huge cult following in Greece, where his followers would participate in mass drinking, and the orgies his mythological companions were so well known for. The Greek Gods represent humanity at its best and worst, from the violent and destructive **Ares** to the beautiful and seductive **Aphrodite**. Greek mythology demonstrates the epic power struggle between parents and children in an endless quest to gain control over the world. Tales passed down from each generation, showing them to be some of the most influential deities in human history that continue to have a significant impact to this day.

Appendix E: Hidden Images

Information encoded within information

Images embedded into music



Another excellent example of hidden images is the popular (or at least it was popular in the 90s) “Magic Eye”. These are stereoscopic images that combine two perspectives, which consequently hides the embedded image. By slightly crossing your eyes,

which creates 2 images in your brain, then slowly merging them (which may take some practice), an image will magically appear when properly aligned. In the image below, there is a butterfly.

This technique instantly allows you to see the slightest difference between seemingly identical images. You can try this yourself at https://thequizimpossible.com/spot-the-difference.

You can also try this in general patterns you see in everyday life or even where there is no obvious pattern. In Carlos Castaneda's Master Thesis in Anthropology (and an immensely popular book in the 70s), "*The Teachings of Don Juan: A Yaqui Way of Knowledge*" (considered a work of fiction by many), the Yaqui shaman Don Juan explains to Carlos that the way to know where to go, to sit, or to understand that which you can't see is to simply cross your eyes and look "in-between" the illusions of the physical reality. This may sound irrational, but imagine going back in time to the 60s, before computers could create such images, and claiming you could see a butterfly.

Music image credits, left to right, top to bottom:

[Equation] by *Aphex Twin*. Image via Jarmo Niinisalo

Windowlicker by *Aphex Twin*. Image via Jarmo Niinisalo

Continuum by *Disasterpeace* (FEZ Soundtrack). Image via Black Coffee Spirit

My Violent Heart by *Nine Inch Nails*. Image via the Nine Inch Nails wiki

Beyond by *Disasterpeace* (FEZ Soundtrack). Image via Black Coffee Spirit

Transitions by *DJ Sonix*. Photograph via guru3d forums

Compass by *Disasterpeace* (FEZ Soundtrack). Image via Black Coffee Spirit

Stripes by *sippenaken*. Image via sippenaken on YouTube. Image via sippenaken on YouTube

Flow by *Disasterpeace* (FEZ Soundtrack). Image via Black Coffee Spirit

Compass by *Disasterpeace* (FEZ Soundtrack). Image via Black Coffee Spirit

Look by *Venetian Snares*. Image via Jarmo Niinisal

Complete images and more at https://twistedsifter.com/2013/01/hidden-images-embedded-into-songs-spectrographs/

Magic Eye image credit: http://9gag.com, @9GAG

Appendix F: An Unexpected Pattern

What is this pattern, and why does it exist?

In the course of writing this book, there was the need to generate sets of chaotic numbers from other sets of patterned numbers. In one case, the results presented a very unexpected pattern.

Numbers were generated by periodically calculating the longitudinal position of the Sun and the Moon (from Earth's coordinates of -34.61262S, -58.41048W, Buenos Aires, Argentina on the 24th of each month at 5:31:07 PM UT) down to 10^{-15} radians. The individual digits of these two values were then concatenated or cross-summed. For example, the Sun's longitude in radians at one moment was 4.2430033683776855, and the Moon's position at that moment was 2.399298667907715. These were then cross-summed until they were reduced to a single-digit value.

- 4+2+4+3+0+0+3+3+6+8+3+7+7+6+8+5+5=**74**
- 2+3+9+9+2+9+8+6+6+7+9+0+7+7+1+5=**90**
- 74+90=**164**
- 1+6+4=**11**
- 1+1=**2**

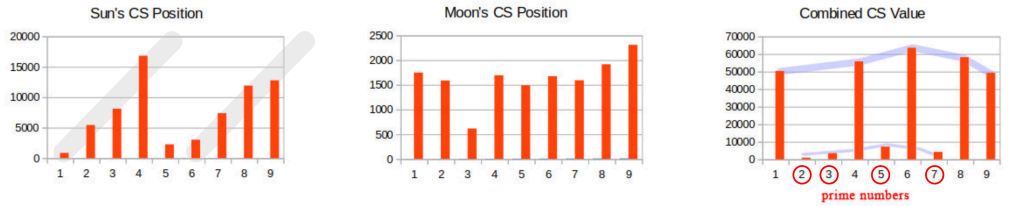
Millions of samples were recorded and reduced to one number per sample. The input data of the Son and Moon positions was perfectly non-random and linear, but the single cross-summed number series of data was "mostly random" according to the *Chi-squared* results of a randomness test[348]. Below are the test results of the single-number data and the data from a random number generator (RNG) for comparison[349].

Data Source	Count	Entropy	Shannon Entropy	Serial Correlation	Mean	Chi Square	Compressible	Stream
All samples	558078	0.99065	7.999718	-0.027037	127.593444	95.44%	0.003524%	byte
RNG	1023999	0.990601	7.999829	-0.000004	127.561555	69.36%	0.002137%	byte

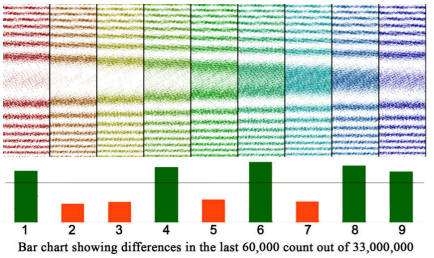
Next, each single digit number (1-9) was assigned a color from the spectrum and then plotted such that each dot occupied one consecutive pixel on one line, and when that line was full, the plot advanced to the next line, just like a dot-matrix printer. This was an extremely simple plot. The below-left plot shows only one number being plotted at a time, and the below-right plot shows cumulative numbers. The distribution of the numbers within the data set of 33,000,000 is shown in the bar chart.

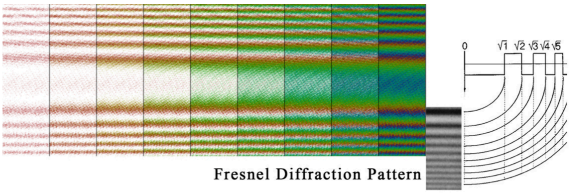
The data was also tested against Benford's law, which states that the 1st digit in a naturally occurring set of values will be distributed in a manner dependent on the log of that number. We looked at 3 sets of data; 1) the crossed-sums of the Sun, 2) the crossed-sums of the Moon, and 3) the crossed-sums of the Sun and Moon combined. We counted the number of each digit 1 through 9 in a data set of 33,575,635 data samples. While the numbers were similar in the count, they were not similar enough to suggest an even distribution such as we would see in random numbers, and therefore

not in accordance with Benford's law. To see these totals, we plotted the difference between the lowest and highest counts (charts below) for each number 1-9. As you can see, there is some very patterned behavior, especially in the first chart and even more so in the last charts, which also shows a unique pattern that only applies to prime numbers.



Much to our surprise, this resulting pattern matches that of a *Fresnel diffraction*.



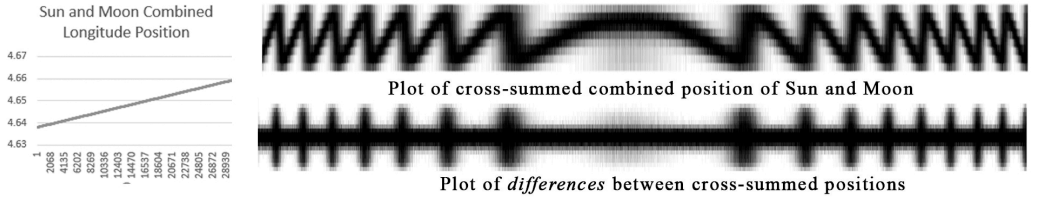


At the rate we were sampling, each position of each "planet" was only about $7x10^{-8}$ radians further than the previous position sampled. This equates to about 23 kilometers of movement for the Sun and only 64 millimeters of movement for the Moon.

When cross-summing numbers, the place of each digit is insignificant, so 123 and 321 are the same as they both cross-sum to 6. Because all the digits in a cross-summed value have equal significance, the slightest measurable movement of the sun is equal to the movement of the two-thousand years it takes to pass through a constellation. This is because 0.000000000000001 is the same as 100000000000000.0

Above, we plotted the values simply as colors, but when we use the actual values of the cross-summed numbers as the Y-axis, with each number advancing one step across the X-axis (time), we get a different perspective, as seen in the top image below. The bottom image is the same plot but only using the differences between each number.

This plot uses 300,000 cross-summed data points that covers 25 minutes of observation.



Surprisingly, the top image appears to be a cross-sectional diagram of a Fresnel lens!

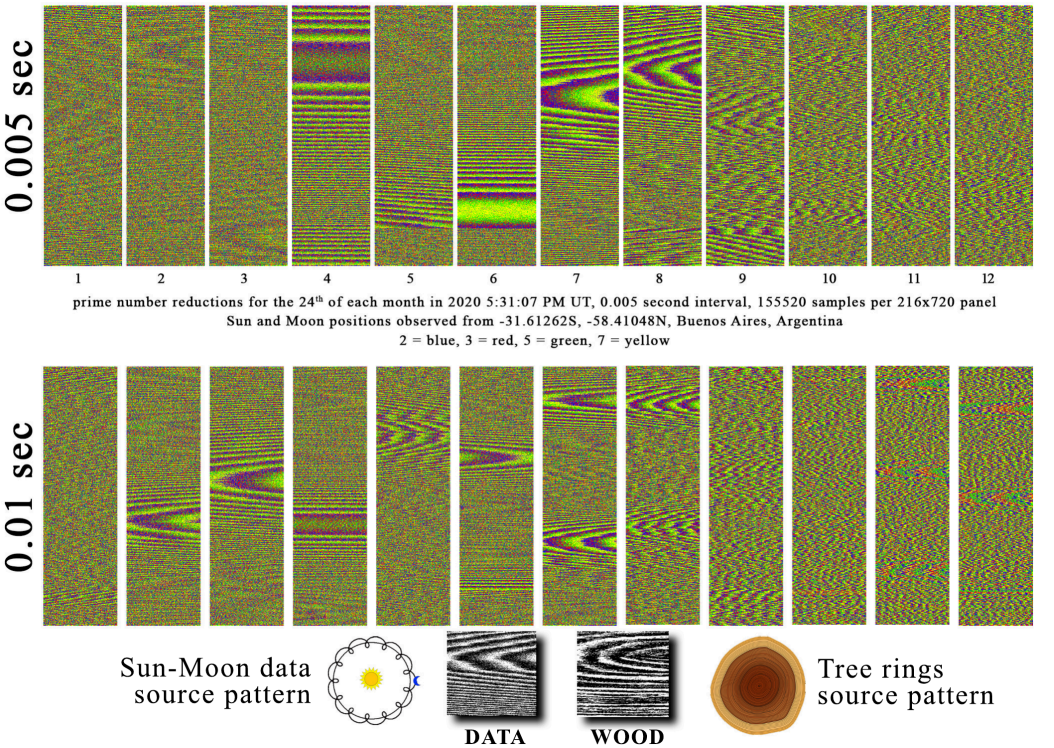
This raises the questions:

- Where do these patterns come from?
- Do they tell us anything about the thing being measured?
- Given that these patterns are the same that describe the propagation and near-field diffraction of light (i.e., Fresnel diffraction), can we apply any other attributes of light to whatever we are observing?

Additional details for the curious

Below are some of the visual results of the plot.

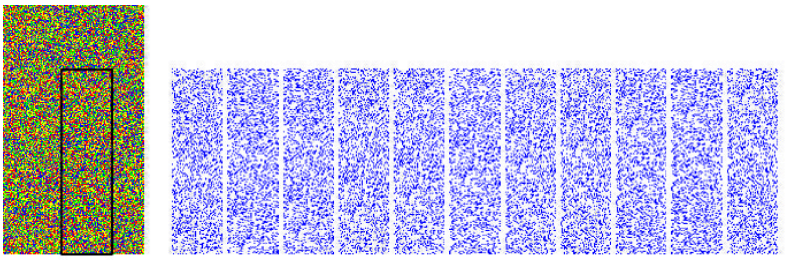
These plots are of data captured every 0.005 and .01 seconds, and we only look at the cross-summed values that are prime numbers (2,3,5,7), but the results were the same when using all numbers 0-9. These twelve plots represent sampled data from each month of the year at the same time.



It is interesting to see how the 0.005s look slightly “zoomed out” compared to the 0.01s. Also interesting is how the plot pattern and the pattern of wood grain is so similar, suggesting the source of these patterns also share a common process, at least mathematically.

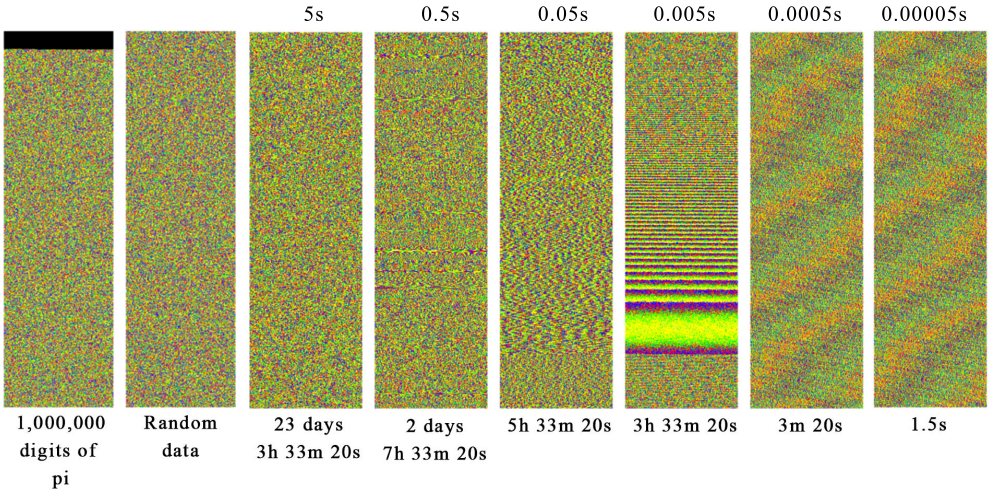
We see another pattern if we change the time between samples from microseconds to days. Below are 10 sets representing 10 months with the same starting point as the sets above, but each pixel represents an entire day (86480 seconds), i.e., the position of the Sun and the Moon was recorded only once a day. This means that the entire set

represents 1,095 years. Each plot looked almost identical and appeared completely random, but upon closer examination, they were not random at all, but a very “zoomed out” view. It is clearer to see the pattern if we only show the blue dots of a small section of the image.

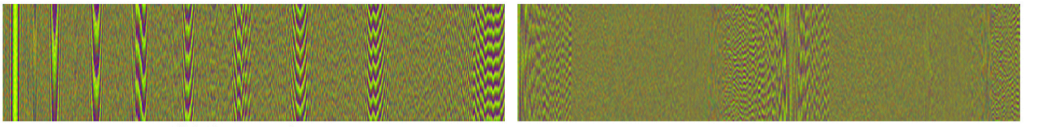


My first assumption was that the farther “out” we zoom in time, the clearer the patterns, but it seems to be the exact opposite; the smaller the time delta, the larger the pattern. This might make sense if we were looking at the linear difference between, say, 1.2345670 and 1.2345678, as the difference would be 0.0000008, and such a small change would need a lot of samples to make itself apparent, but this does not apply here because we are cross-summing the numbers together, making the place of the digits meaningless.

Below is a comparison of the patterns at each scale. The values above the images are the interval sampling time, and the values below are the sample’s entire duration. No obvious pattern can be seen at 5s, but a slight pattern begins to emerge at 0.5s, becomes more apparent at 0.05s, and is most dominant at 0.005s. A pattern is equally visible in 0.0005s but appears only as a simple oscillation or wave. 0.00005 is identical to 0.0005 because (it seems that) once we start going below 0.002, we hit the limits of resolution. This is the point where we begin getting duplicate data because the Sun or Moon has not moved enough in the small amount of time between samples, and the smaller we go, the more duplicates we get. For example, at 0.00001 second intervals of sampling , to get the 155,520 unique data points to create the graph, we need to sample 50,000,000 times. This simple wave pattern is the 1st wave pattern we can detect (given the limitation of my laptop and/or the ephemeris used to calculate planetary positions). This simple wave pattern is what then evolves into the more complex patterns. Presumably, the difference between sample points in the wave patterns is only the rightmost last digit being increased by 1, given that we keep sampling until we get the next unique number.

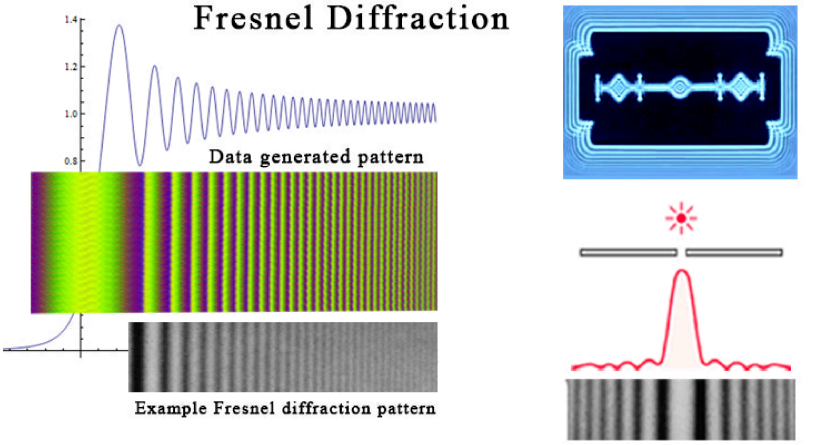


How do we have patterns when we sample at 0.01, but nothing (significant) when we sample at .05? I think this has to do with where we are sampling from within the entire pattern. The two images below show that the Fresnel pattern is slightly altered with time but eventually returns. It looks like Fresnel diffraction at its most ordered point, but at its least ordered point, it looks identical to pure random data (but we assume it is just as ordered, only difficult to see that order).



When the data is sampled, we have no idea where we are within the cycle of repeating patterns, so it is only by chance that we will end up in an ordered section.

For those not familiar with Fresnel diffraction, it is the way that light interferes with itself as it travels around the edge of an object



Digging Deeper

Having no idea where to look for more information, I posted this to various mathematics forums, and even though the question was read by many, no one had an answer. I then sent this question to my old friend, who is an accomplished physicist but who also considers these speculative ideas to be a waste of time, so I knew any answer he gave would include an unabashed commentary on the silliness of it all.

He did not disappoint on either front. I'll forego the commentary and just focus on the relevant part of his reply, which was very short. Essentially he told me that no matter how hard you try to create random numbers from non-random data, you will always end up with some sort of a pattern. "Why?" was my naive response, to which he replied only, "Look into Zipf's law".

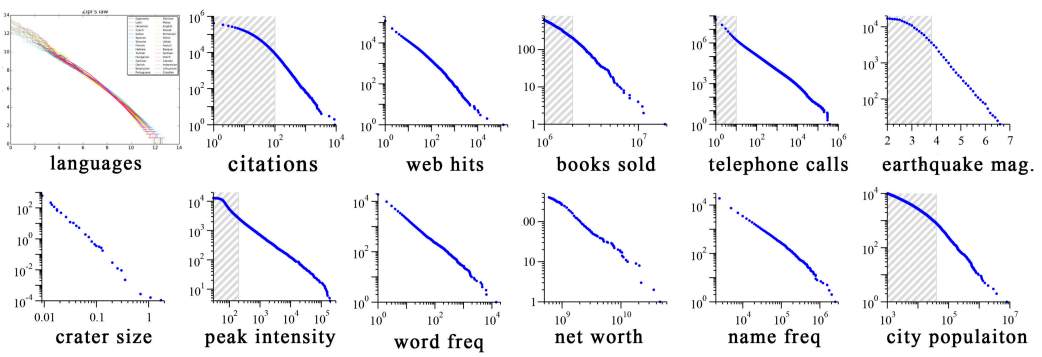
Zipf's law is (from Wikipedia):

> *an empirical law... that refers to the fact that many types of data ... can be approximated with [certain types of] power law probability distributions. Zipf distribution is related to the zeta distribution but is not identical.*

There are 2 very significant points in this definition. The first is that it is an *empirical law.* Something is called an *empirical law* when it can be observed but not proven (yet). The second important detail is that *Zipf distribution* is related to *Zeta distribution*. We'll get to that in a moment.

Zipf's law was not discovered by physicists or even within the hard sciences. It was a French stenographer, Jean-Baptiste Estoup (1868 - 1950), that first discovered the patterns of words which became Zipf's law after it was popularized by the American linguist George Kingsley Zipf (1902 - 1950).

It seems that all languages, from every corner of the world, both modern and ancient, follow Zipf's law in the way words are distributed in both writing and speaking (and by inference, some implicit pattern in the way we think). We don't need to drill into the details, but what is significant is that this same distribution pattern is also seen in city populations, solar flare intensities, protein sequences, immune receptors, the amount of traffic websites get, earthquake magnitudes, the number of times academic papers are cited, last names, the firing patterns of neural networks, ingredients used in cookbooks, the number of phone calls people received, the diameter of Moon craters, the number of people that die in wars, the popularity of opening chess moves, even the rate at which we forget... and countless more. [350]



In short, Zipf's law is an example of *power laws*, and power laws touch everything in existence in one way or another. But what does this have to do with anything? This is where the second point applies. The charts above are called *Zipf Distributions*, and they all have different scales of values based on the kind of data being sampled. If we reduce all the scales to 1, we have what is called a normalized *Zipf distribution*, also known as a *Zeta distribution*. Mathematicians use the *Riemann zeta function (RZF)* to study and test these distributions. This function is written as **ζ(*s*)**, where ***s*** is any complex number other than 1.

Example 1 : *The RZF formula can use either natural numbers or prime numbers to get the same answer. This is why the RZF is so important in understanding primes numbers.*

$$\zeta(s) = 1 + \frac{1}{2^s} + \frac{1}{3^s} + \frac{1}{4^s} + \frac{1}{5^s} + \ldots = \frac{1}{\left(1-\frac{1}{2^s}\right)\left(1-\frac{1}{3^s}\right)\left(1-\frac{1}{5^s}\right)\left(1-\frac{1}{7^s}\right)+\ldots}$$

Example 2 : *RZF with an argument of* 2, *which gives a very unique and relevant answer.*

$$\zeta(2) = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \frac{1}{5^2} + \ldots = \frac{1}{1} + \frac{1}{4} + \frac{1}{9} + \frac{1}{16} + \frac{1}{25} + \ldots = \frac{\pi^2}{6}$$

Example 3 : *With an argument of* -1, *the RZF sums the infinitude of all natural numbers but gives an unexpected answer. This is empirically validated as it is used successfully in physics, especially String Theory.*

$$\zeta(-1) = \frac{1}{1^{-1}} + \frac{1}{2^{-1}} + \frac{1}{3^{-1}} + \frac{1}{4^{-1}} + \frac{1}{5^{-1}} + \ldots = 1+2+3+4+5+\ldots = -\frac{1}{12}$$

Related sidenote, using just prime numbers, you can also determine π, but this has nothing to do with RZF: $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} + \ldots = \frac{\pi}{4}$.

One of the useful features of the RZF is that it can turn a *divergent* series of numbers (numbers that, when you add them together, approach infinity) into a *convergent* series (when the sum approaches a specific value, like $-\frac{1}{12}$ or $\frac{\pi^2}{6}$). It can do this because the hypothesis uses the concept of *analytic continuation* and *complex numbers*. You can play with this function using an online Riemann Zeta Function Calculator. [351]

The RZF is based on the *Riemann hypothesis*, which also states that ζ(*s*)=0 only when *s* is a negative even integer or a complex number with the *real* part of $\frac{1}{12}$. This hypothesis is quite profound in how it relates to the distribution of prime numbers. That won't be explained here, but it is understandable when properly explained. There are a couple of excellent videos on the subject at https://www.youtube.com/watch?v=sD0NjbwqlYw and https://www.youtube.com/watch?v=d6c6uIyieoo.

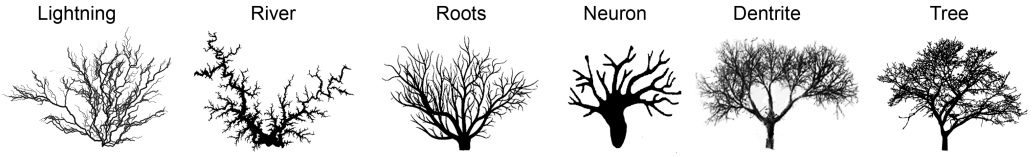
However, this 160-year-old hypothesis has yet to be proven, and because it is considered by many mathematicians to be the most important unsolved problem in pure mathematics, the Clay Mathematics Institute has a reward of US $1,000,000 to anyone who could solve it. *(Update. September 24, 2018. Michael Atiyah , the 89 year old mathematician emeritus at The University of Edinburgh, claims he has proved this, but many experts doubt its validity)*

Understanding how the RZF works would (probably) help explain how and why patterns of numbers appear organically in any data set of naturally occurring samples, such as the charts above.

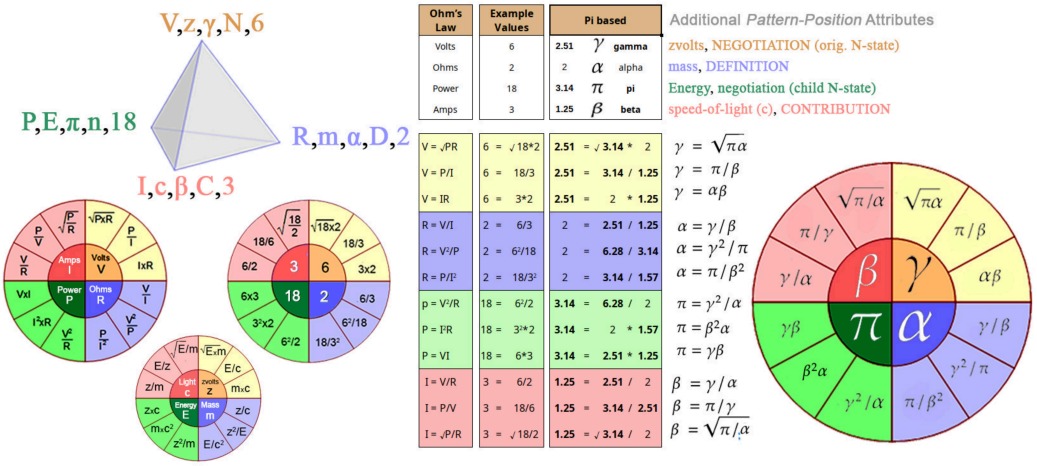
What value would we get if we applied the RZF to the series of square roots of natural numbers, the same numbers that define a Fresnel diffraction? Some really smart person did exactly this [352], and the answer is… voilà!

$$\sqrt{2\pi}$$

This is the inverse of $\sqrt{\frac{\pi}{2}}$, and is especially interesting because now we have a formula that fits into the *pattern-position* of Ohm's law and Newton's laws of motions. This is consistent with and supports the ideas put forth earlier that archetypal functions or formulas instantiate differently depending on their context, similar to how the energy of nature interacts with itself across various contexts, as previously shown. For clarity, we'll refer to contextual functions that are algorithmically identical as having the same *pattern-positions* (*PP*). An example of this, as previously shown, is the single (fractal) function with various contextual parameters that describes energy interacting with itself across various contexts.



In this case, as we are only looking at Ohm's law and its 12 formulas, we see that $\sqrt{\frac{\pi}{2}}$ has the same *pattern* as $\sqrt{\frac{18}{2}}$ or $\sqrt{\frac{P}{R}}$ at *position* 11:00 (as in the 12-hour clock) on the 12-part wheel we are using, and we can test that by plugging in the appropriate values. The table below shows these pi-based values that seem to describe the pi-based values we are seeing with regard to Ohm's law. For the sake of clarity, I assigned some of the formulas to variables; otherwise, it's too bothersome to read (or compose). In the table below, I show Ohm's law with some previously shown examples plus the simple math examples and then the application of $\sqrt{\frac{\pi}{2}}$ and $\sqrt{2\pi}$. Those 2 values alone were enough to fill in all the missing values. In the middle column of the table, I show the actual numbers and the formulas to the right.



Ohm's Law	Example Values	Pi based			Additional *Pattern-Position* Attributes
Volts	6	2.51	γ	gamma	zvolts, NEGOTIATION (orig. N-state)
Ohms	2	2	α	alpha	mass, DEFINITION
Power	18	3.14	π	pi	Energy, negotiation (child N-state)
Amps	3	1.25	β	beta	speed-of-light (c), CONTRIBUTION
V = √PR	6 = √18*2	2.51 = √3.14 * 2			$\gamma = \sqrt{\pi\alpha}$
V = P/I	6 = 18/3	2.51 = 3.14 / 1.25			$\gamma = \pi/\beta$
V = IR	6 = 3*2	2.51 = 2 * 1.25			$\gamma = \alpha\beta$
R = V/I	2 = 6/3	2 = 2.51 / 1.25			$\alpha = \gamma/\beta$
R = V²/P	2 = 6²/18	2 = 6.28 / 3.14			$\alpha = \gamma^2/\pi$
R = P/I²	2 = 18/3²	2 = 3.14 / 1.57			$\alpha = \pi/\beta^2$
p = V²/R	18 = 6²/2	3.14 = 6.28 / 2			$\pi = \gamma^2/\alpha$
P = I²R	18 = 3²*2	3.14 = 2 * 1.57			$\pi = \beta^2\alpha$
P = VI	18 = 6*3	3.14 = 2.51 * 1.25			$\pi = \gamma\beta$
I = V/R	3 = 6/2	1.25 = 2.51 / 2			$\beta = \gamma/\alpha$
I = P/V	3 = 18/6	1.25 = 3.14 / 2.51			$\beta = \pi/\gamma$
I = √P/R	3 = √18/2	1.25 = √3.14 / 2			$\beta = \sqrt{\pi/\alpha}$

All of this may have nothing to do with unraveling the mystery of the Fresnel pattern hidden in the data, but it is interesting nonetheless, specifically:

- ***α*** is in the same *PP* as *resistance*, *mass*, *DEFINITION*, and the 1st, and only even, prime number of 2. 2 is the only number in these formulas unrelated to π. In the RZF, the inverse of this prime number, $\frac{1}{2}$, is the only value that returns 0, as in $\zeta(2^{-1})=0$, or $\zeta(\frac{1}{2})=0$. In the RZF, this value marks the center of the symmetry for all numbers produced by the RZF, natural and complex. In other words, the $\frac{1}{2}$ point, not the 0 point, is the pivotal point that mirrors all the values on one side of the $\frac{1}{2}$ mark and which are reflected on the equal but opposite side of $\frac{1}{2}$. This is relevant because the RZF seems to be very related to the creation of the Fresnel pattern.

- ***β*** is the opposite *PP* of ***α*** and the inverse of ***γ*** and occupies the *PP* of *CONTRIBUTION*, *current*, *the speed of light*, and the next prime number, 3.

- ***γ*** is defined as $\sqrt{2\pi}$, which is also the result of RZF of the square roots of all natural numbers greater than 1, which is the sequence of values that defines a Fresnel lens and our distance-delta plots. That sequence of natural numbers is created by ζ(-1). The *PP* of ***γ*** is that of *volts* (the amount of potential that exists between two opposing limits) and of *NEGOTIATION* and shares the *PP* with 6.

- ***π*** is in the same *PP* as *Power* (electrical), *Energy*, and the *white-dot* of the tholon where all three points combine to create a 3D tholon. However, it could also represent the new N-state that is created on the spectrum between ***α*** and ***β*** (or *DEFINE* and *CONTRIBUTE*), as the tetrahedron can not become 3D until the child N-state is created.

- The spectrum of ***α*** and ***β*** where all new N-states appear is also the spectrum between the only two prime numbers, 2 and 3 (6 and 18).

- ***α*** and ***β*** are in the same *PP* as the prime numbers, and the remaining two variables are products of these two numbers. In this specific case, for the pi-based formulas to work, the value of 2 must be in the *PP* of 2. (See *Squares and Square Roots* chapter in Appendix C, “Tholonic Math” for more about the miracle of the number 2)

  We also see that ***γ*** equals $\sqrt{10.3354255600999}$, which is the volume of a four-sided pyramid with a base length and height of π (because $\pi^3/3$ = 10.3354255600999).

The Cornu Spiral

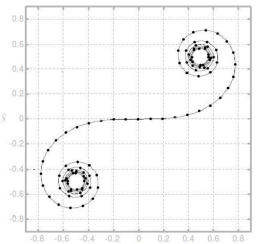
While the manner in which the cross-summed numbers create a diffraction pattern may be a mystery (to me), how diffraction patterns are created are not. Properly described, it would require a lot of math which we won’t get into here, but a quick search on “What is the Cornu’s spiral method for diffraction pattern?” will reveal all

to the more curious. In short, because we know that the intensity of light at any point is always proportional to 2 values known as the *Fresnel integrals* $\begin{cases} x(t) = \int_0^t \cos(u^2)\,du \\ y(t) = \int_0^t \sin(u^2)\,du \end{cases}$, we can plot the intensity of each point along the diffraction pattern on a 2-Dimensional plot. When we do this, we end up with an amazing figure called the *Cornu Spiral*, shown below as "2D Cornu Spiral (Fresnel)".

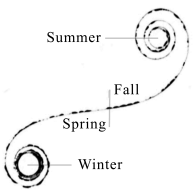
Another interesting thing about the Cornu Spiral is that it also describes the path of the sun over the course of the year (from Earth's perspective)[353], which is pretty poetic. It appears as though the Cornu spiral describes not only how light and matter interact on the nanometer scale but also on the planetary scale, at least in one sense.

Not surprisingly, the Riemann Zeta Function also creates not just one Cornu Spiral but an entire series of spirals, as shown in "Cornu Spiral (RZF)", that emerge from nothing and continues to expand from within itself.

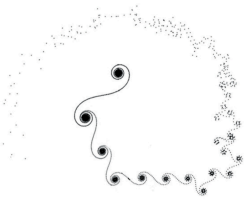
The *x* and the *y* values are the result of a function based on a single value, as in *x(t)* and *y(t)* of the Fresnel Integrals, but there can be a third dimension based on *t*. When this new *z(t)* dimension is proportional to the *x* and *y* dimensions, a cone is created on the z-axis, which might be related to the diminishing angles of the diffraction pattern in the "Slightly zoomed out" plot of the cross-summed data patterns shown above.



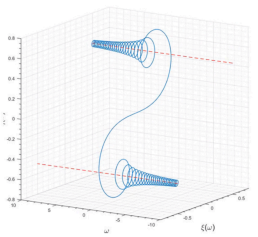
2D Cornu Spiral (Fresnel)



Sun Spiral



Cornu Spiral (RZF)



3D Cornu Spiral

So, by saying the following…

- The Cornu Spiral describes the diffraction pattern.
- The RZF describes a Cornu spiral.
- The RZF is a normalized version of the Zipf Function.
- The light of the sun hitting Earth creates a Cornu-ish spiral over the course of a year.

… we can relate our mystery pattern to several other patterns, including Newton's 2nd, but the most dominant ones have to do with the nature of light.

In one way, it is like the cross-summed numbers are similar to photons in that the individual photons create the diffraction pattern, just like the individual numbers of our data also create the diffraction pattern. Both of these "particles" (photons and numbers) are presumably following some of the same rules in some fashion if we are to judge them by their resulting patterns. Given my lack of training in this area, I can only wonder if photons' wave/particle properties also apply (contextually) to

cross-summed numbers or numbers in general. Perhaps they are somehow related or similar to *Feynman Sunshine Numbers*, which relates prime numbers and photons, among other things. These numbers include RZF values that appear in the description of sunshine, ancient relics of the Big Bang, and the theory of photons, electrons, and positrons.

Cross Sum Patterns

It seems useful to say something more about cross-summed numbers.

Cross-summing multi-place numbers like a carnival numerologist will generate seemingly meaningless data, at least with respect to the quantitative significance of that data, but it will have plenty of information about the nature or quality of the original number. For example, a single-digit cross-summed value preserves many of the same properties as the original uncross-summed number, no matter how large that number is. A cross-sum divisible by 3 means the entire number is divisible by 3, and if divisible by 9, then the entire number is divisible by 9. We all know that if the last digit of a number is 2, then that number is divisible by 2, but it is also true if the cross-sum of the last 2 digits of a number equals 4, then that number is divisible by 4. Testing for divisible by 8 can also be done by cross-sums but is a bit more complicated. You join the 2 leftmost digits, multiply by 2, and then add the rightmost number. For example, if a number ends in 464, such as 7464, then $2\times(\mathbf{46})+\mathbf{4}=96=12\times8$. Now we know that 7464 is also a multiple of 8, which is the case; $8\times933=7464$.

10 is obvious, but 11 is very interesting. If we have the number 5025669, to test for divisibility by 11, we reverse the number, giving us 9665205. We then do an *alternating* cross-sum like so: 9-6+6-5+2-0+5=11, so 5025669 is divisible by 11 ($5025669\div11=456879$). This is interesting because 11 cross-sums to 2, and we can use the number of places used to test for divisibility as exponents of 2 ($2^0=1$, $2^1=2$, $2^2=4$, $2^3=8$). With these numbers, which is a binary expansion, we can apply the oscillating functions or - and + to get a final number, and if that number is 11, then the original number is divisible by 11!

Divisibility by 7 is also interesting because it uses recursive cross-sums. To test the number 371, we take the rightmost digit and multiply it by 2, then subtract that value from the remaining digits:

$37 - (2\times1) = 35$

Then we do that again on the answer:

$3 - (2 \times 5) = -7$;

Cross-summing is like a form of *qualitative* math. In all these examples, the cross-summing told us something about the *quality* of the number, such as how it can be divided, regardless of the *quantity* of the number.

If we have patterns of non-random numbers, we can use cross-summing to learn of some quality of that pattern.

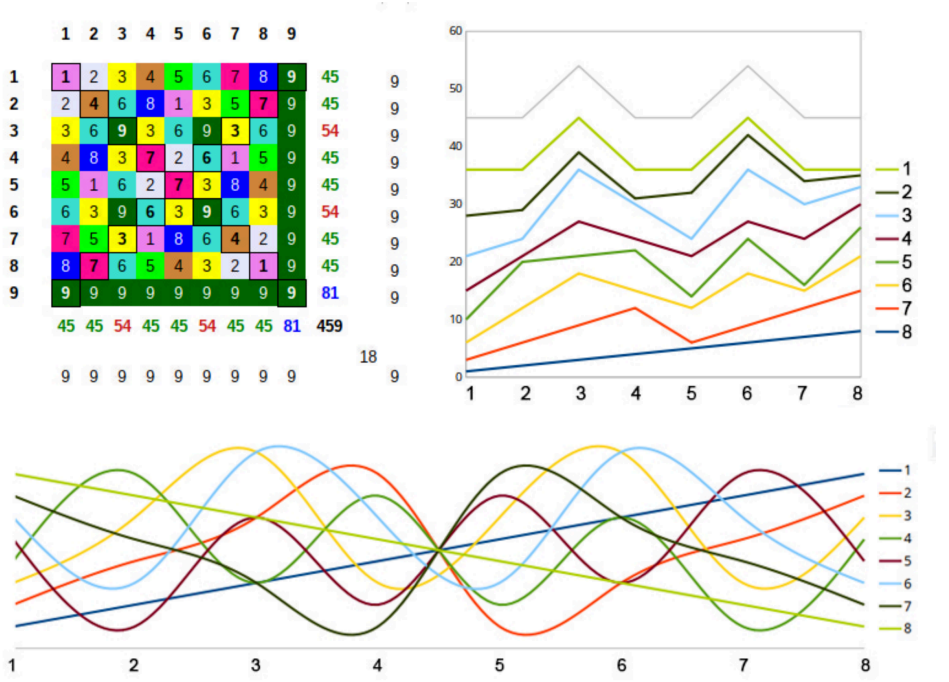
For example, if we create a list of number that increases by 8, as in 8, 16, 24, 32, 40, 48, 56, 64, 72, etc., and then cross-sum them as follows:

Step	Num									CS
1	8	=								8
2	16	=	1 + 6	=						7
3	24	=	2 + 4	=						6
4	32	=	3 + 2	=						5
5	40	=	4 + 0	=						4
6	48	=	4 + 8	=	12	=	1 + 2	=		3
7	56	=	5 + 6	=	11	=	1 + 1	=		2
8	64	=	6 + 4	=	10	=	1 + 0	=		1
9	72	=	7 + 2	=						9

…we get a resulting sequence of 8, 7, 6, 5, 4, 3, 2, 1, 9 which continually repeats itself.

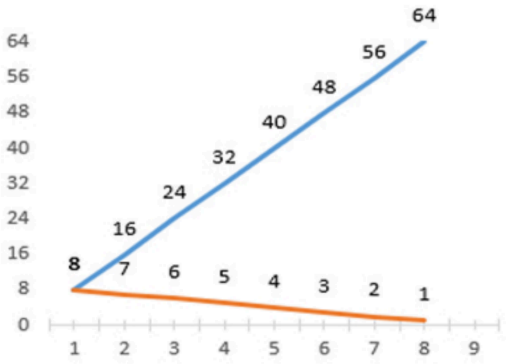
Our original data was sequential because it was tracking the linear movement of planets, so that means that the progression of values will always represent progressive points on a linear path, with each value being slightly larger (in this case) than the previous value, but when we cross-sum these values, all spacial or temporal information is lost leaving only the pattern of the relationship of the numbers. For example, 10 is larger than 9 but cross-sums to 1. Here, 1 represents the *lower octave* (for lack of a better term) of 10. Cross-summing essentially lowers all the numbers to the same octave. We see this in the number matrix below (left), as any consecutive sequence of digits will always repeat one of the nine patterns shown in the matrix. While this removes a lot of quantitative data, it does not remove the relationship between the data. In fact, it makes that relationship clearer, much like listening to a 10-octave piano piece in only 1 octave.

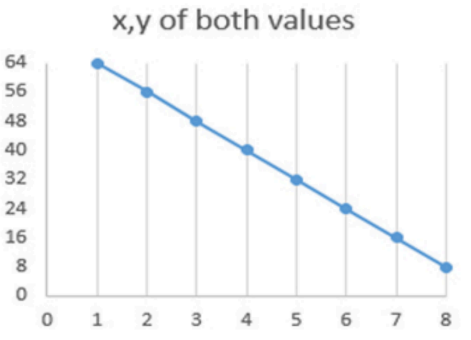
This number matrix shows the repeating pattern of every sequence of numbers that increases by the number in the left column. The chart on the right shows the changing progression of each row in the matrix is only 6 stages of transformation between the straight line at the bottom (1) and the perfectly ordered line at the top (8). The line above that (9) are the totals of each line, which also happens to be exactly the same pattern as line 8. The graph at the bottom shows these same numbers but non-stacked and smoothed, and here you can see the symmetry of the progressive changes. This example applies to any sequence of integers.

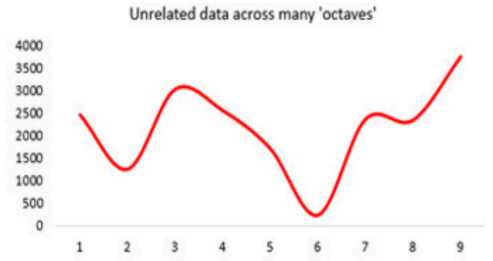


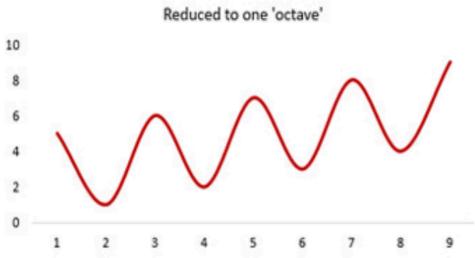
In our example of the series of numbers based on multiples of 8, we have two types of numbers; the quantitative values and the cross-summed values that represent their “position” or relation to other numbers within the context of a base-10 number system. In the charts below, the top-left chart shows both of these values as 2-dimensional and shows how the quantitative value can decrease as the cross-sum value increases. The top-right chart shows the values of 2 dimensions plotted as x and y, which shows that the difference between the diverging values is linear.

Further below, the left chart is a plot of what appears to be un-patterned data, but when we reduce it to one octave by cross-summing, we see a very clear pattern.



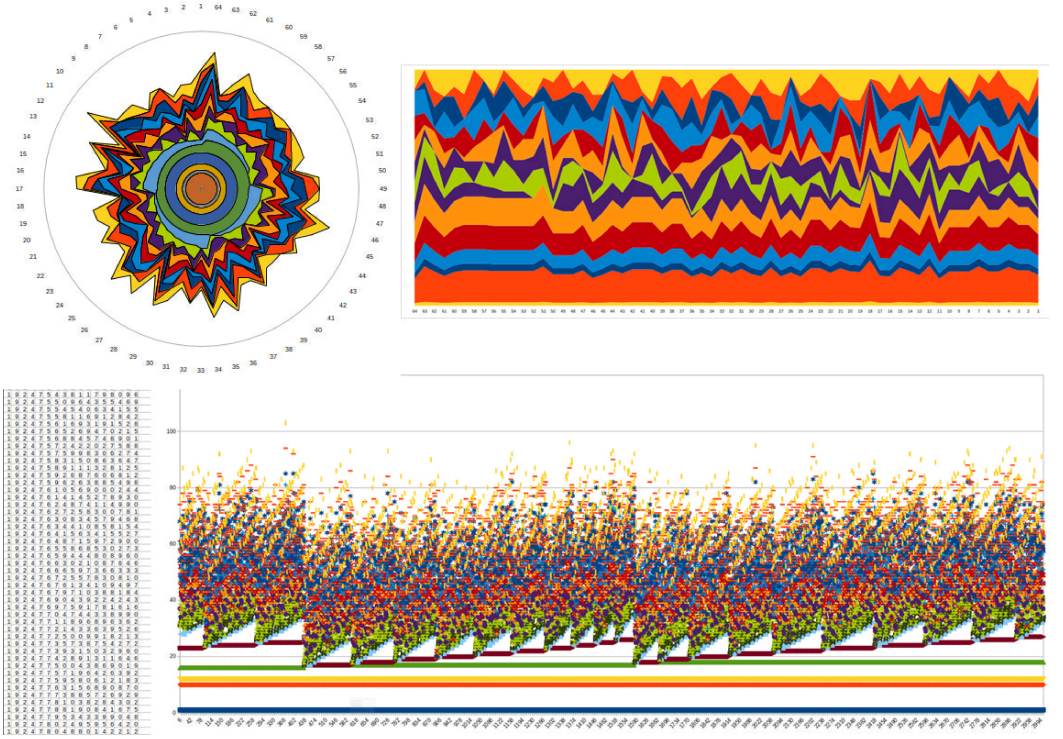






The point of this is to demonstrate how there can be hidden patterns in seemingly un-patterned data that has nothing to do with how it exists in time and space.

Attempts were made to replicate the patterns that appeared in the planetary data with various other inputs, such as incremental counting, the number of seconds from some moment, a number and some function of that number, such as square root, but nothing was able to get even close to the Sun/Moon patterns. This suggests that the Fresnel pattern is not solely an inherent cross-sum pattern but a result of the source data. If that is the case, could it be possible that the Fresnel pattern is a property of the movement of the Sun and the Moon or at least 2 rotating bodies in the same system?



The image above is more fun than informative because it fuels the imagination. The top left and right charts show 64 samples of the position of the Sun to 14 places. The values of each place are then plotted as one set of data. For example, if there are 3 samples of data of 1.23, 4.56, and 7.89, we plot the 1st line as 1,4,7, the 2nd line as 2,5,8 and the 3rd line as 3,6,9. Were this a live, real-time plot, we would see the outermost circle (or top-most line) changing thousands of times per second and the innermost (or bottom) changing every couple of months. If we plotted time instead of space to 14 places, the outer (or top) would change a million times a second, and the inner (or bottom) would change once every 11 days. Looking at the upper left image, it is very interesting (although probably statistically meaningless) that there is an obvious pattern in the first 6 values, and with the 7th, that pattern quickly begins to degrade.

The bottom images (of the image above) is simply a graph where each value is a dot over the course of 3,000 samples.

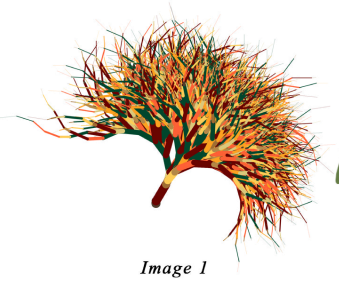


Image 1
Sun's position

Image 2
Random data

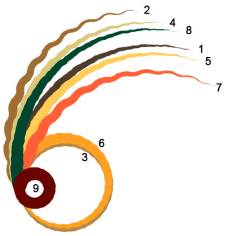


Image 3
CS patterns to 18 places

Image 1a
Random Data Emitting
in one direction

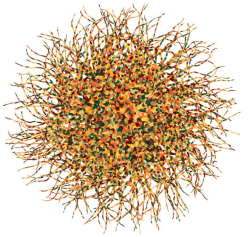


Image 1b
Random data emitting
from all directions

Image 3a
CS patterns to 200 places
(zoomed out)

The images above were created by plotting each digit of the Sun's position (x-axis) and showing some interesting patterns worth highlighting.

- In ***Img. 1***, we begin with the first number at the bottom. Each subsequent digit is plotted *3×number* degrees to the left or right, with even numbers to the right and odd numbers to the left. For example, the number 9 would be plotted 27 degrees to the left, and the number 8 would be plotted 24 degrees to the right. The width of the line is relative to the digit's place, so 1.0 is wider than 0.1, which is wider the 0.01, etc. The image in the 2nd</sup row, ***Img. 1a***, is the same algorithm but based on random numbers rather than the Sun's position. The reason for odd=left and even=right was to see what pattern we would get if we applied one property to even numbers and a different property to odd numbers. We can see this same attribution in the ancient Taoist tradition of even as yin and odd as yang and in the ancient Greek tradition, where even numbers were feminine in nature and odd numbers masculine [354]. If there was any validity to this attribution, then we would expect to see a pattern common in nature, which is exactly what we get. ***Img. 1b*** is the same as ***Img. 1a***, but where the initial direction of each line is random.
- ***Img. 2*** is similar to ***Img. 1***, except each number is plotted adjacent to the previous number (and the colors were changed, the deviation was lessened, and the length of the plot was slightly shortened).
- ***Img. 3*** is something entirely different. Rather than using the position of the Sun, we used the recurring cross-summed patterns of the sequence of numbers when we increased counting by 1 through 9 (as shown in the number matrix above). The image below ,***Img. 3a***, is that same sequence but with a much larger value so as to see its larger pattern. Interestingly, we end up with three distinct groups; 1,4,7 (cross-sum=12=3), 2,5,8 (cross-sum=15=6), and 3,6 (cross-sum=9).

Appendix I: Market Data

Given the arguments made so far, it should not be surprising that certain patterns exist, albeit obscured, within seemingly random data, such as the stock market.

One test that anyone can test for themselves shows such a hidden pattern. In the example, we have 14 months of data (632,869 values) from the 1-minute chart of Bitcoin/ USD-Tether (BTC/USDT) from the Binance exchange from Jan 1, 2021, to Feb 14, 2022.

Start at the beginning of the data and take a series of values, such as 16, 24, 32, etc., consecutive values. In this example, we will use 16 consecutive values. This means we have a 632,853 (or 632,869 - 16) sets of 16 values that looks something like:

Raw data

```
     1: [19695.49, 19646.79, 19607.03, ..., 19537.95]
        ...
632853: [42136.31, 42164.06, 42129.1, ..., 42194.44]
```

Then ‘normalize’ the data to reduce each set’s values within the range of -0.5 to +0.5:

Normalized data

```
     1: [0.5, 0.20914, -0.02830, .... -0.44087]
        ...
632853: [-0.38965, 0.035047, -0.5, ..., 0.5]
```

Then apply a moving average (of 3) to these normalized values:

Mean data

```
     1: [0.5, 0.20914, -0.02830,..., -0.44087]
        ...
632853: [-0.38965, 0.03504, -0.5, ..., 0.5]
```

Finally, round these values to a single digit:

Rounded data

```
    1:  [5, 2, 0, ...,-4]
        ...
632853: [-4, 0, -5, ..., 5]
```

The purpose of the above is to create sets of single values that represent the original values and, in the process, remove the ‘noise’ in the data.

We then split each set into two parts, the first 8 values and the last 8 values, sum the values of each part, and subtract the 1st part from the 2nd part.

For example, if we were using sets of 8 values, we'd have sets that look like this:

```
[-4, 0, -5, -3, -4, 1, -1, 5]
```

Splitting and summing the 1st part results in **-12** *(-4 + 0 + -5 + -3)*, and the 2nd part results in **1** *(-4 + 1 + -1 + 5)* . Therefore, subtracting the 1st from the 2nd part results in **13** *(1 - -12)*.

We now have a single number representing the relationship between the first and last half of every set.

We'll call these values ***s1*** for the 1st part, ***s2*** for the 2nd part, and ***sd*** for the difference between ***s2*** and ***s1***.

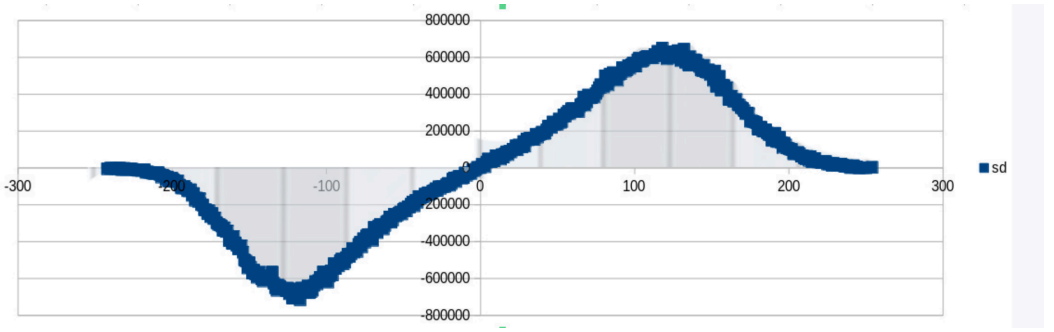
To equate these values to something meaningful, such as the actual values of the transactions, we apply the same rule and sum all the original values together. We'll call that value ***sv***.

There are now 3 values for each set: ***sv***, ***s1***, ***s2***, ***sd***... for example:

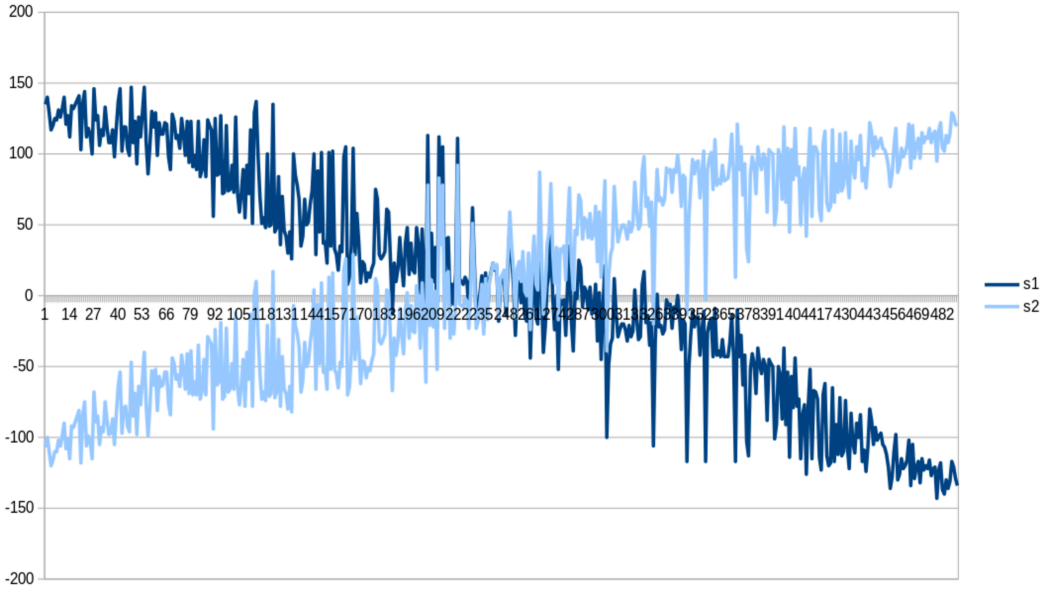
```
-5221, -242, 135, -107
358483, 69, -20, 49
```

If we plot the actual values (***sv***) against the difference (***sd***), we see a very familiar form, that of a wave or cycle:

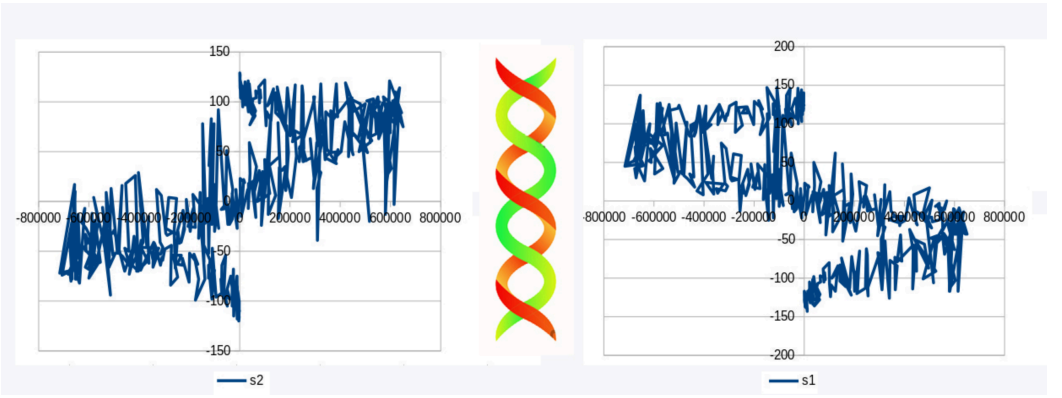
Note: These plots were made with data sets of 63 values to increase the clarity of the plots



If we plot ***s1*** against ***s2*** we see another familiar form:



If we look at the plots of ***sv*** against both ***s1*** and ***s2***, we see 2 opposing ‘waves’, essentially a double helix:



This tells us that any ***sd*** with a value above 0 will yield profit, and any ***sd*** below 0 will lose money. The ***sd*** values form a curve, showing that (in this case) an ***s1*** value between 50 and 100 (for 16 values, 100-150 for 63 values) is the most likely to return the most profit in ***s2***.

In this way, we can predict the future.

This pattern is the same for any size sample, which means it can predict the next 8 minutes or the next 8 hours.

That is the theory, at least. In actual practice, when applied to trades on the Binance exchange against the 1-minute charts, going long on every transaction that has ***sd*** > 0 (along with some other control parameters) and closing at the first opportunity returns about 50% annually, which seems intuitively correct given we are only looking at 2 “forces”, positive and negative.

To further test this...

Suspecting that my results might be due to something other than what I was testing for, I devised another test that used a different method on different data. My new algorithm looped through about a million data points of real-time closing prices for BTC/USDT. At every point, it took the previous 16 values and assigned a 1 to a value greater than the previous value or a 0 if less than the previous value. I then recorded the original value from positions 0 and 15, the first and last values, of each 16-element array.

This created 1,000,000 records that looked like:

```
0000000000000000, 20000, 21000
0000000000000000, 21000, 9000
0000000000000001, 32123, 31321
...
1111111111111110, 32101, 34321
1111111111111111, 32101, 34326
```

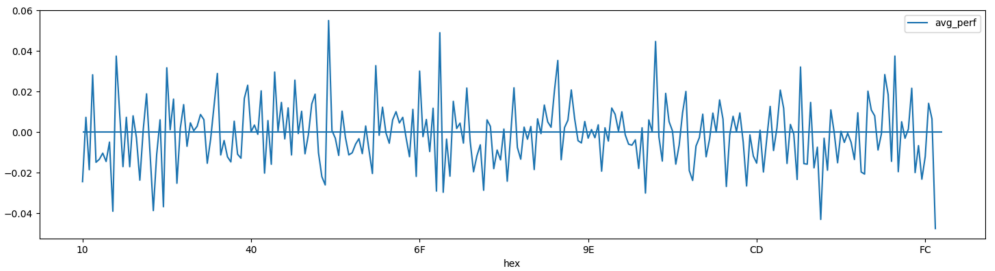
I wanted only 2^{16} (65536) of these records, one for each unique binary value, so I averaged all the amounts that had the same binary pattern (of 16 1s and 0s) to create one record for each of the binary values. For example, the two entries above of 0000000000000000 now become one entry:

```
0000000000000000, 20500, 15000
```

(20500 = avg(20000+10000), 15000 = avg(21000+9000)

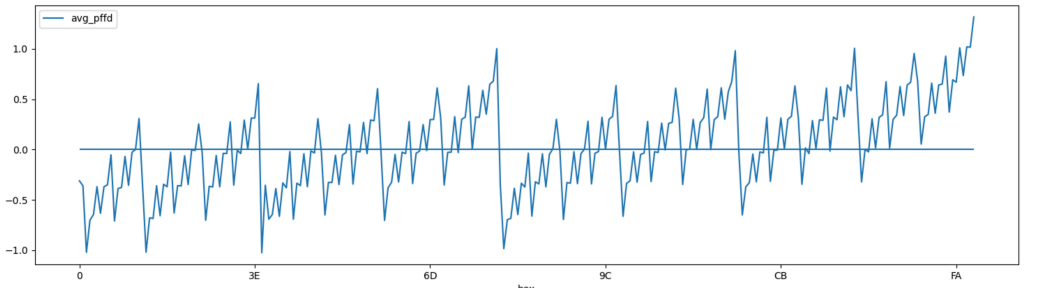
Now, there are 65,536 entries, each with the average beginning and ending price of its 16 elements.

I plotted the percentage difference between the beginning price and ending price on the Y-axis and the value of the first 8 bits of each binary value on the X-axis. My assumption was that the Y-axis values, the % difference, would be generally random, so I was expecting to see something like this:

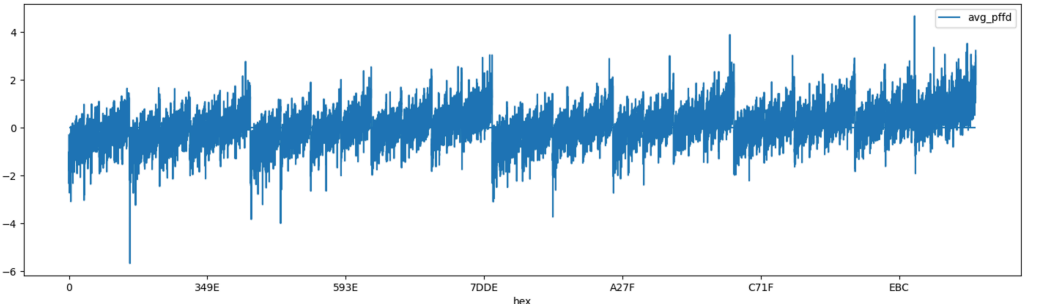


The above image is the plot of the average ratio of the number of BULL elements (last price > first price) over BEAR elements (last price < first price) for each binary value that begins with value 0 - 255

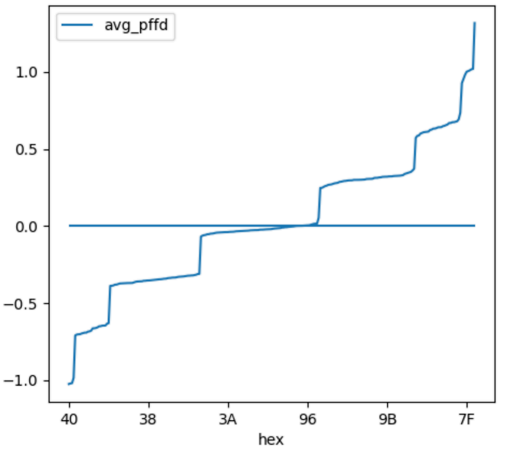
Instead, I got this!



The above image is just a small set to show the patterns. Plotting all 64k points looks like this:

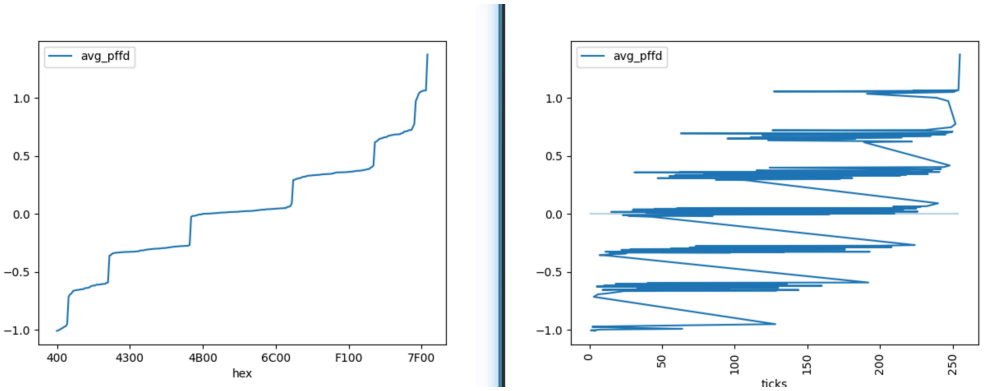


Sorting the data by % instead of by hex values shows a more linear, less fractal pattern:



What is equally surprising (to me, at least) is the stepped aspect of the line.

If the plot is changed to only use the first 8-bit (right) values and not 16-bit (left) values when plotting, we get the essentially same plot in a series of ‘octaves’.



This second test suggested that: Any sequential 16 prices (in real time for BTC/USDT at least) will tend to end higher when there are more DOWN than UP values in the first 8 prices and will tend to end lower when there are more UP than DOWN in the last 8, regardless of what the other 8 bits are doing.

This supports the first example that also states that any delta value that is above 0 (meaning the 1st part is less than the 2nd part, i.e., there are more DOWN values that UP values in the first part) will yield profit.

The Tholonic idea here is that even within random or unpredictable data, the laws of cause and effect create patterns that create balance. When there is an imbalance on one side, it is predictable that this will soon be followed by an equal and opposite imbalance. While it is impossible to predict where the balance point will exist in the future, given that there are unpredictable opposing forces constantly exerting pressure, what can be predicted is the potential opposing force to the current dominant force.

However…

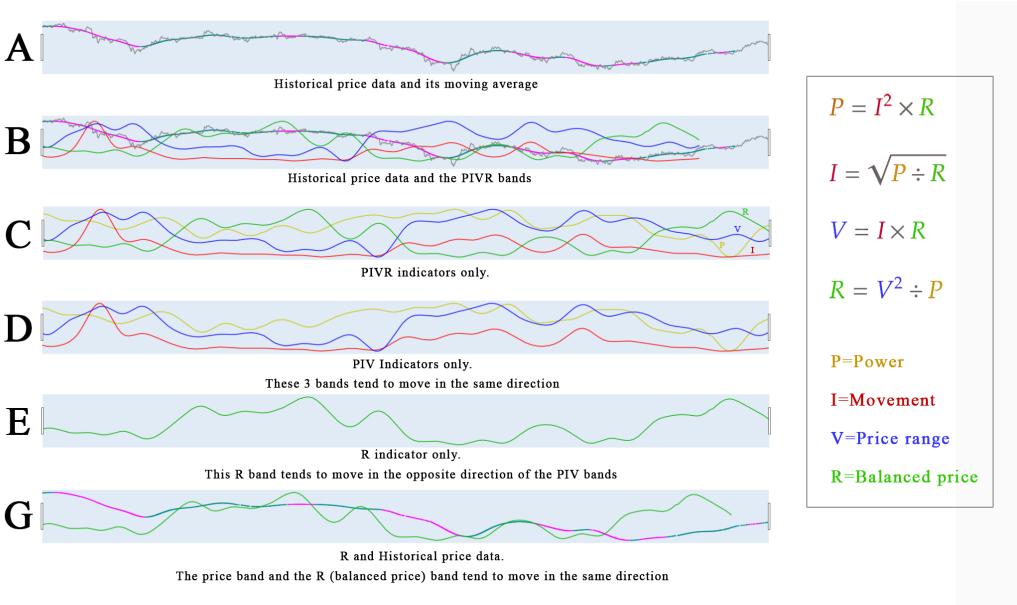
These patterns are the same for any series of random numbers. When I ran these same tests using random numbers between 1 and 1,000,000, the result was visually identical. It works with market data because that, too, is random, for all intents and purposes. So, while these patterns do not tell us anything new about market data specifically, they do tell us something about the cyclical nature of even the most unpredictable events.

Applying Newton's 2nd law to the Market

Note: This is very 'beta'.

Here is a more detailed example of the earlier reference to Newton's law and how it might apply to finance.

Below, in row A, we have the historical price data of the cryptocurrency of Etherium, recorded every 15 minutes from December 12, 7:45, to December 13, 17:25. The squiggly line is the raw data, and the overlaid smoother line is the moving average of the day's trades.



We assign the following concepts in the following manner:

Voltage (V), the potential between the highest and lowest points of energy, is assigned to the difference between the *opening* and *closing* price for each 15-minute period, as this represents the price potential for that period.

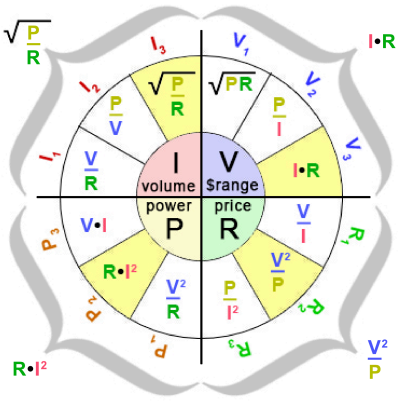
Current (I) is the quantity of energy that is moving, which we assign here to the volume of trades that have taken place in that time period.

With these 2 values, we can calculate the following:

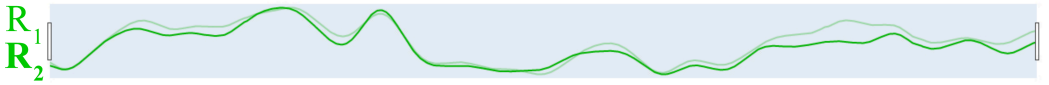
Resistance (R) is calculated as R=V÷I, representing the asset's theoretically ideal value or price. We refer to this value as the *Balanced Price*, but in reality, the actual agreed-upon price is rarely this value, as you can see in ***Row G***, which compares the *Balanced Price* (R) with the actual price. Interestingly, while the *Balanced Price* is calculated, the actual price is the result of the resistance between the seller wanting a higher price and the buyer wanting a lower price.

Power (P) is also calculated as R=V×I (but it is not clear what P represents yet).

In the above image on the right, there is a legend that shows the formulas used to describe these values. This requires a bit of explanation. Each value of P, V, I, and R can be calculated using 3 different formulas with the remaining 3 values. When we do this with electricity or matter, all 3 formulas for each value give the same result, as expected. Here, however, they give slightly different results. For example, calculating $R_1=V\div I$, $R_2=V^2\div P$, and $R_3=P\div I^2$, we'd expect all three values of R_1, R_2, and R_3 to be the same, at least in the case of electricity, but here they are all slightly different. However, when all 3 band values are added together, they form the exact same pattern as that of $R_3=P\div I^2$. This is the same for all 4 formulas, and the above formulas have the same pattern as the totals. This is why we say the above formulas *describe* rather than *calculate* the values because all 12 formulas can do the *calculations*, but only 4 formulas seem to *describe* them.



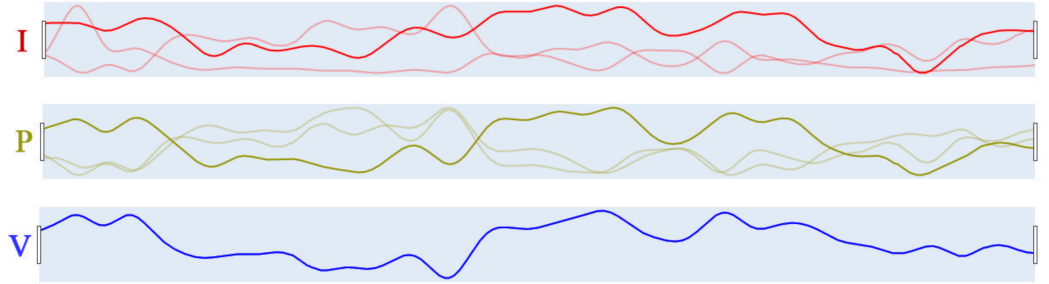
The issue here is that even though we should be using the R_3 formula, we can't because we do not have the values for P, as we only have the values V and I we can only use the R_1 formula. R_1 and R_3 are not the same, but they are very close (R_1 light, R_2 bold):



If we were to show all 3 R bands, it would look like this:

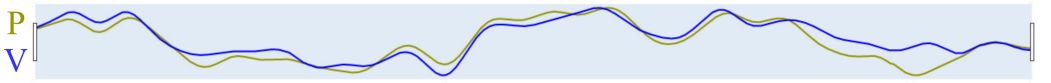
When these 3 bands are added together to form 1 new band, we get a single band that, when normalized to the same scale as the single bands, is exactly the same as the single band formed by I^2/P.

Here are the other bands as well:

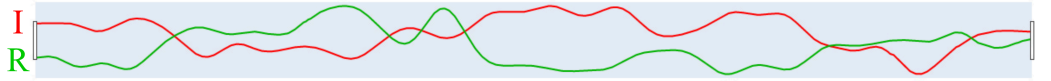


This last one is a surprise because we are actually seeing all three bands; they just happen to be exactly the same for all the formulas!

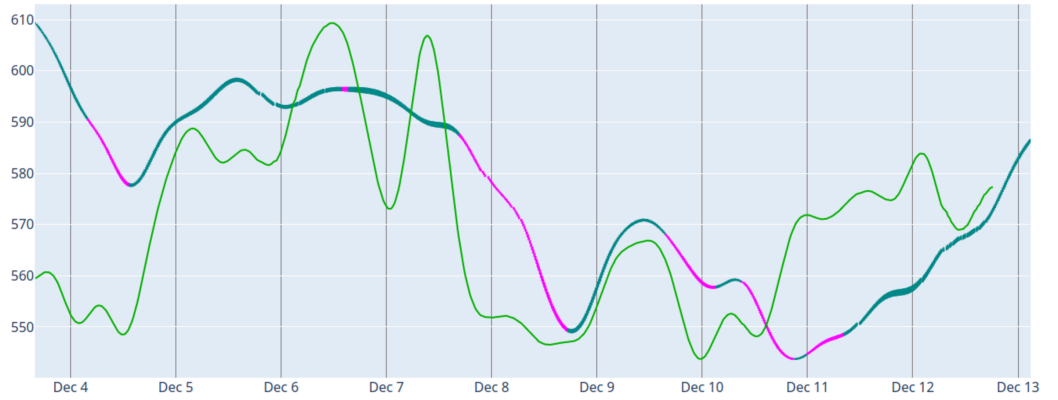
Tholonically, this is very interesting because, if you remember, V is the N-source, and P is the result of the N-child. If you look at P and V, you will notice how similar they are:



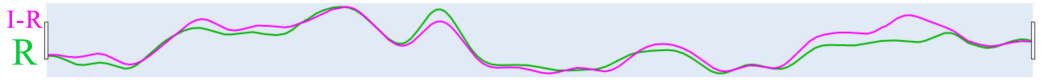
This would then suggest that I and R should be opposites, which they are:



We might then expect to see the closing prices fluctuate in-between these two bands, but it seems pretty clear that the closing price follows the R line (below).



If we multiply them, we get V, as V=I×R, and if we look at the difference between them, we get something very close to R again:



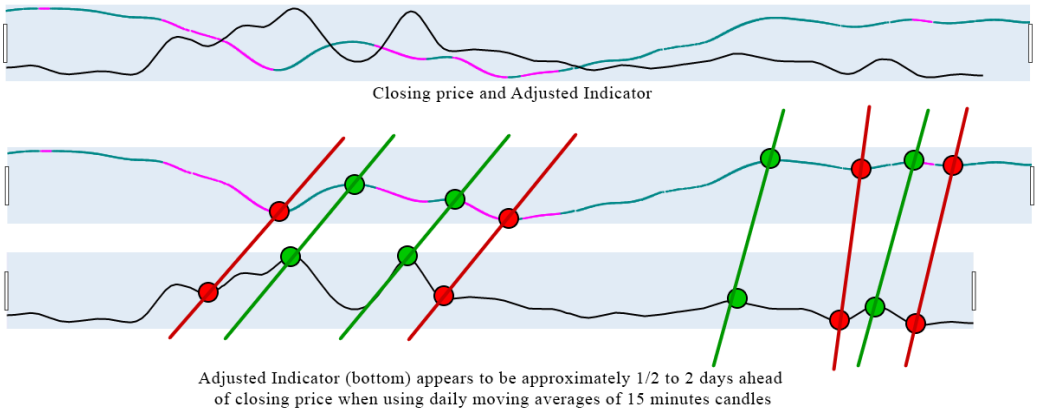
In order to make these bands comparable, all the data of all the lines were normalized to the minimum and maximum of the closing prices, but the rise and fall of the values were still too extreme to properly compare. We took the nth root of the number to fix this. In these examples, n=8 and anything after 8 was pretty similar. See the charts on the right to understand the ranges for these lines.

Band	Min	Max
R	0	161
I	0	12
P	0	74
V	0	9
close	535	619

The R band appears to be consistently predictive of the closing price, and I suspect that if we understood more about the other lines, we could build a pretty decent market indicator.

This model seems to work better for shorter windows, like 15 minutes, than larger windows, like 24 hours.

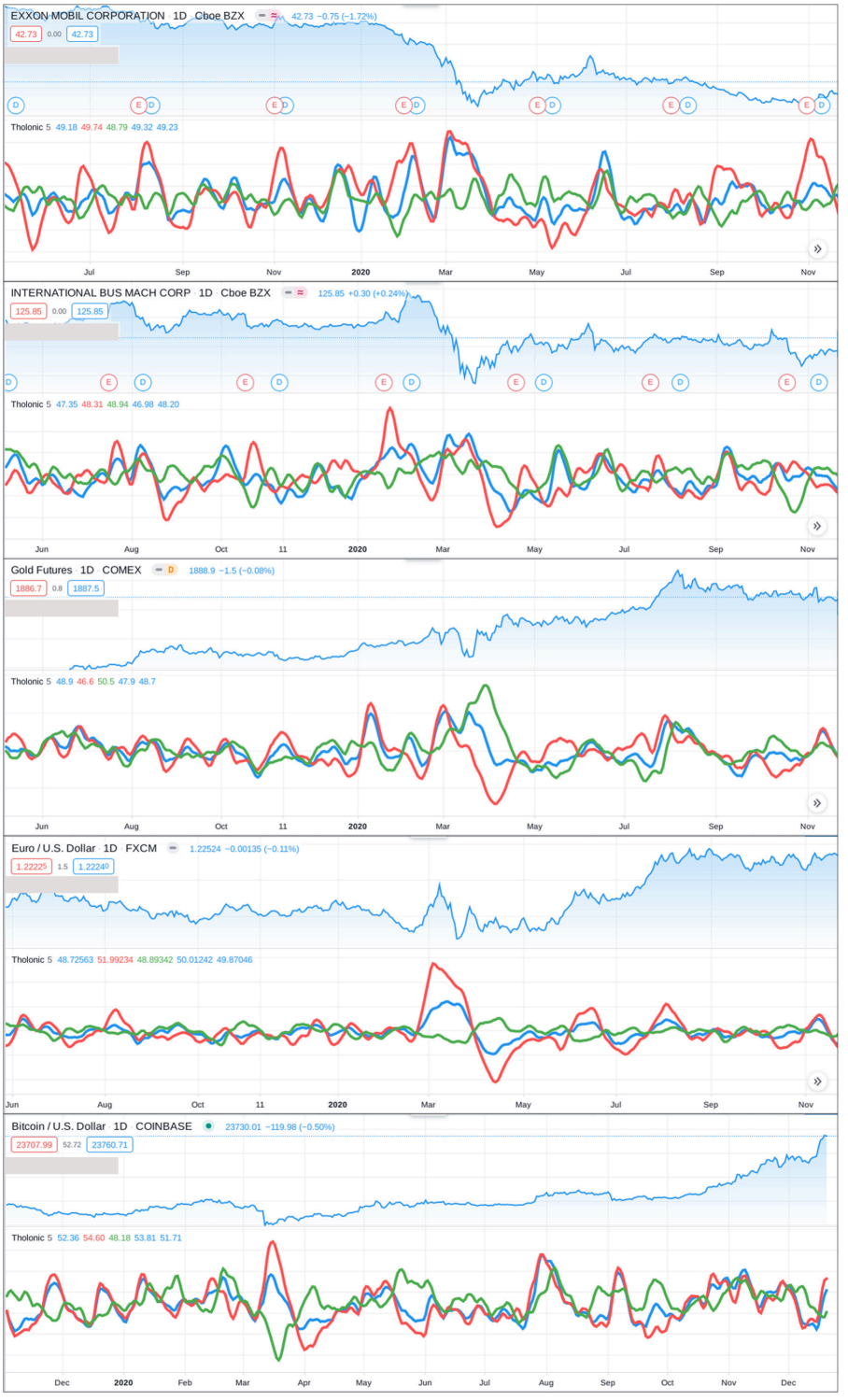
As a test, considering we are looking at this tholonically, below is a chart where the black line is the value that is (V÷R) × (V÷I), which we're call the *adjusted indicator*. This curve is similar to the P curve but different enough to make a pattern more obvious.



Closing price and Adjusted Indicator

Adjusted Indicator (bottom) appears to be approximately 1/2 to 2 days ahead of closing price when using daily moving averages of 15 minutes candles

For those who analyze the market, here is this model (applied to the Tradingview platform) applied to stocks, commodities, foreign exchange, and crypto:


EXXON MOBIL CORPORATION 1D Cboe BZX
42.73 −0.75 (−1.72%)
42.73 0.00 42.73
Tholonic 5 49.18 49.74 48.79 49.32 49.23
Jul Sep Nov 2020 Mar May Jul Sep Nov
INTERNATIONAL BUS MACH CORP 1D Cboe BZX
125.85 +0.30 (+0.24%)
125.85 0.00 125.85
Tholonic 5 47.35 48.31 48.94 46.98 48.20
Jun Aug Oct 11 2020 Mar May Jul Sep Nov
Gold Futures 1D COMEX
1888.9 −1.5 (−0.08%)
1886.7 0.8 1887.5
Tholonic 5 48.9 46.6 50.5 47.9 48.7
Jun Aug Oct 11 2020 Mar May Jul Sep Nov
Euro / U.S. Dollar 1D FXCM
1.22524 −0.00135 (−0.11%)
1.22225 1.5 1.22240
Tholonic 5 48.72563 51.99234 48.89342 50.01242 49.87046
Jun Aug Oct 11 2020 Mar May Jul Sep Nov
Bitcoin / U.S. Dollar 1D COINBASE
23730.01 −119.98 (−0.50%)
23707.99 52.72 23760.71
Tholonic 5 52.36 54.60 48.18 53.81 51.71
Dec 2020 Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Appendix J: Structuring Water

Some additional information for the curious

I personally experienced similar results to those reviewed in the animal studies. In my own experiments I created SW simply by spinning 1 liter of water with a chemical stirrer in a magnetic field made of 6 equidistant, and opposing, magnets glued to the outside of the water jar, which was about 6 inches at its widest part. Each magnet (15mm x 3mm NbFeB 42 MGOe) has a strength 2335 *Gauss* at the closet point inside the jug, which drops to 3 *Gauss* at the center of the jar 3 inches from the magnet, and which drops to about 8 *Gauss* in-between the magnets (which are about 3.5 inches apart each.) These are a bit weak, considering a magnetic field strength of 1000 to 3000 is required, but the *Gauss* drops below 1000 after 7 mm inside the jar. The water is spinning, so all the water is exposed to the stronger fields, but as it is constantly rotating, that exposure is temporary.

This was the only water I drank for close to a year, and neither my diet nor lifestyle changed in any significant manner during that time. The difference in the before and after blood tests were compatible with the tests on animals. My blood panel was generally better regarding cholesterol levels, but the most dramatic change was my triglycerides dropped from 750 to 150. This is anecdotal, but considering my results matched those of controlled tests on animals, it was enough for me to accept that structured water should be at least be seriously studied.

Making Structure Water

We look at three ways to create structured water.

Before we get into the techniques, there is an important point to make that is being made here because if you are reading this you have obviously maintained both an open mind and a level of interest that is prerequisite to the following topic. As we have mentioned, ideas have archetypes, and those archetypes have instances. One of the archetypes of Ideas is form. This would then suggest that ideas can alter archetypes of form, which can alter an instance of form. Tholonically speaking, that is exactly right. The mere thought of something has some effect on the instantiated form of that thought.

This is relevant to creating structured water, or any creative process, but water seems to be a particularly sensitive medium. The thoughts you impose on the water have an effect on the water. While the scientific support for this claim is still being collected, evaluated and debated, from a purely tholonic perspective, it is a valid hypothesis that focusing your awareness on water will have some effect. Also in accordance with tholonic ideas is that increasing the structure of water will create a better medium for interacting with, energetically.

Manually

Vortexing (whirlpooling) water by hand was shown to be effective in improving growth differences in plant tests, but it is not easily applied to larger-scale needs. It is fairly easy to create a vortex in a container of water some small tubes and a water pump, or a chemical stirrer, which spins a magnet inside the water.

There also does not seem to be one standardized accepted technique to manually structuring water. One technique that seems to be popular is a homemade version of the same technique used in some of the industrial-sized units, and that is simply using marbles as a water filter. The reasoning behind using marbles is that the natural structure of water that is reinforced by its movement over and through the terrain, rivers, rocks, trees, etc., is destroyed by being processed, stored in stationary reserves, channeled through pipes, chemically modified, and a number of other modifiers. Simply flowing water over and through a marble filter causes the water to form many small eddies as it is constantly divided and reunited, allowing the water to return (closer) to its natural, more structured state.

People have reported favorable results by simply filling a tube with glass marbles, pouring water in one end and collecting the water on the other end. The processed can be repeated numerous times or placed inline to a water pump vortexer. If marbles work, then using the same reasoning, a sand filter would probably work even better. The Center for Disease Control has an entire page on sand filters (https://www.cdc.gov/safewater/sand-filtration.html).

Anything that forces water to reform itself is thought to have some effect. Some people say using quartz helps. Tholonically, this would make sense as we claim that structure is the result order, order is the result of energy, energy has fields and fields have induction.

Magnets have also been used. Although it may make sense that one could use magnets, no one seems to do a decent job of explaining how they work. The intuitive reasoning is simply that magnets are fields caused by order, therefore, magnetic fields can induce order. Some of Australia's largest produce farms have been using magnetic water with phenomenal results, needing 25% less water to produce a superior product than with traditional water, according to Seven West Media, Western Australia's leading news service.[355]

Simple instructions can be found on the web[356] for making a Hero's Fountain (named after the first-century Greek mathematician Heron who discovered this process of an energy-free recycling water fountain) that recycles water through a loop. Fill one of the bottles with marbles, or whatever you like, and when the cycle is complete, you have a bottle filled with restructured water.

Commercial Attachments

Devices such as the Martin-Wasserwirbler (MW) attachment are small devices that claim to restructure water typically by creating a vortex within the device. The Martin-Wasserwirbler (developed in Germany) is an attachment that forces the water through a series of vortex-creating channels made of oppositely charged metals. I am slightly suspicious of this last bit as they say they use silver and gold as the oppositely

charged metals, but both of these metals have similar ionization and electronegativity properties, so unless they are doing something to these metals to change that, it's not clear how they can be oppositely charged. This is not to say they are not, just that it is unclear.

The MW device was the first device to create structured water and was based on the ideas originally conceived by the brilliant Viktor Schauberger, the Austrian forest caretaker, naturalist, parascientist, philosopher, inventor and biomimicry experimenter, and his son Walter Schauberger, both of whom studied the qualities of water.[357]

The idea that the qualities of water lost due to its processing could be reintroduced by creating a vortex within the water was originally brought up in 1972 in a conversation with civil engineer Wilhelm Martin, who was working on ways to improve tap water. In 1997 Martin published his paper "Experimente mit Leitungswasser" (Experiments with Tap Water)[358]. In that paper, he describes the Martin-Wasserwirbler (Martin Water Vortex, MWV) and his 30 years of experimentation with the concept.

Tests with the MWV have shown positive results, such as a rise in pH, oxygen content, and a decline in water temperature. Unfortunately, there are no tools that exist to measure many of the qualities of water that we believe are its most important, which is the manner water moves, stores, and transmits energy, including the energy of awareness.

Industrial Solutions

Pursanova is a company that makes complete water processing system for residential, commercial and industrial applications. Their products range from $20 to many thousands. They have a number of case studies on their website (pursanova.com) which are astounding.

Disclaimer: I have no relationship with any of these companies and am not promoting any of their products. I refer to them simply because my research seems to indicate they are legitimate products in an industry filled with wild and dubious claims.

Below are the tests I ran myself. Tests ***(j)*** and ***(k)*** were run numerous times with the same results. The results showed that the SW had an obvious effect in disintegrating the material faster and more thoroughly. This would suggest that the SW had lower state of entropy/higher energy potential than the CW.

I suspect this is due to hydrogen bonds which have various lengths, directions, and strengths, and which can change, and even break with kinetic energy and movement.

We know that formation of hydrogen bonds in water can have large effects on the water's entropy, and that even small changed to water's entropy can have a considerable influence[359].

Hydrogen bonds in water are still a matter of debate in the science community.

Structured Water:
Prelimirary Test Results

Water from same 50 ltr tank of bottled water at 20 deg C.. AW magnetically whirlpooled for 1 hr at 20 deg C @ approx 10 CPS,

Yellow = SW (structured water)
Blue = CW (common water)

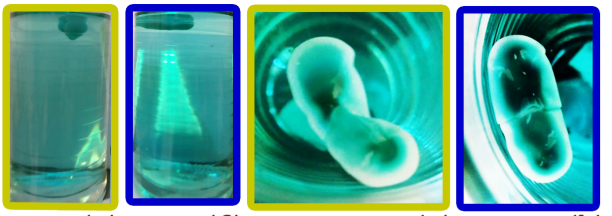
44 min.

(a) (b) (c) (d)

Two hard gel (brittle,100% natural, vegan) capsules of vitamin D3 approx.12mm in length.

Significanty more dissolution of form and dye sediment in AW. Both suggest that AW has greater solvent properties than the CW.

8 hrs.



(e) (f) (g) (h)

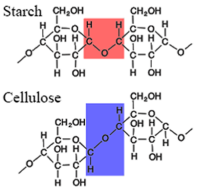
Dye is totally dispersed in both, and water is same color. CW pill has pushed away from edge suggesting some force from higher activity and is significantly more disolved that CW pill.

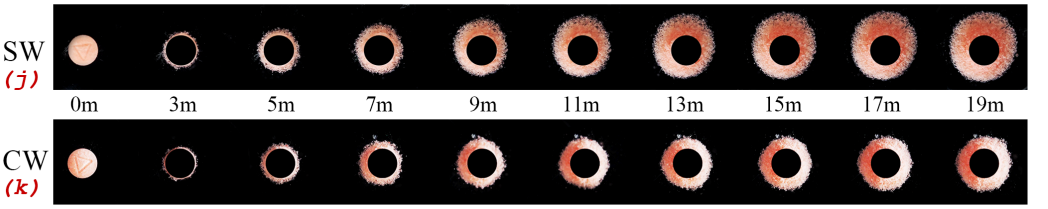
SW CW

(i)

pH of ~6.5 unchanged

Wider and faster dispersion. Bubbles could be seen rising from the SW tablet, and none to very few from the CW tablet. (tablets of tramadol chlorhydrate, an opoid pain killer, but main filler is probably starch or cellulose; nearly identical)





Appendix K: William James Sidis

The overlooked genius

The Man

The topic of Newton's 2nd law, time, and the nature of reality includes the work of several philosophers, great thinkers, and scientists, but omitted from that list is perhaps one of the greatest thinkers of our time, a man few have ever heard of; William James Sedis.

William was born April 1st, 1898 and is considered by many to have been the greatest child prodigy in recorded history. His father, Boris, was a Ukrainian Jew and merchant who left Ukraine for New York City after he served his 2-year prison sentence in a 20-square-foot cell for the crime of teaching peasants how to read and write. Boris, along with the thousands of other poor and struggling immigrants in New York City's Lower East Side, scrapped out a miserable existence but never lost sight of his goal to become a doctor. It was there that Boris met his wife, Sarah, also a Russian Jewish immigrant. Not surprisingly, Boris was an atheist and rejected all traditional forms of religion and pedagogy, including Freudian psychology, the manners of education, and their institutionalized diplomas and intelligence tests, calling them "silly, pedantic, and grossly misleading".

Sarah's ambitions required her to attain a high school diploma, which she considered a near-impossible task as she only had a 6th-grade education. Boris tutored her in his own manner, showing her how to apply deduction using the first 3 proofs from Euclid's "The Elements" (c. 300 BC). With that alone, she passed her high school equivalency math test and was eventually accepted into Boston University. Boris received a scholarship from the J. P. Morgan Fund. Boris and Sarah quickly advanced in their fields and became close friends with the day's leading thinkers. One of these friends was William James, the great philosopher and "Father of American Psychology", who once asked Sarah, "If they call me a genius, what superlative do they reserve for your husband?"

While Sarah was qualified to practice medicine, she never became a doctor, choosing instead to dedicate her time to being a mother after they had their son, William, who was named after their dear friend. Sarah and Boris believed that parental involvement in child rearing was essential in developing intelligence. William's intelligence was always considered and supported from the day he was conceived. This nurturing and the fact that he was born to brilliant parents is why he was feeding himself at 8 months and reading the New York Times by 18 months. Sarah shared part of this nurturing process:

> *Avoid punishment in all ways possible, as it is the first cause of fear. Try not to say, "don't". Instead, say why what you say is so. Awaken curiosity; it is the key to learning. Never fail to answer. Never put off your child's questions. Never force your child to learn nor judge his ability to learn by adult standards.*

> *Implant ideas at bedtime just before sleep. Suggestions made then will make a solid impression. Never lie to your child or use evasions. Refrain from showing him off.*

At age 4, William learned Greek and, as a birthday gift to his father that same year, also taught himself Latin. By age 8, he had written 4 books on various subjects, including astronomy, anatomy, and the grammar of a new language called *vendergoot* which William had a hand in creating. His weakest subject was math, but Boris applied the same techniques he used with Sarah, which allowed her to cover 6 years of math in 3 weeks. Soon, William became proficient in math as in all other subjects. He displayed savant-like abilities in math and numbers, being able to instantly know the day on which any day in history occurred, but unlike a savant, who typically have a general intelligence of an imbecile, William's general intelligence was off the charts. Albert Einstein had an IQ of 160. William's IQ was estimated to be between 250 and 300 (*Note: Many experts believe ratings over 160 quickly become meaningless*).

William's parent's pre-newage, progressive parenting philosophy did have some drawbacks. Because she did not want to force William to learn, he was enrolled in a regular school, which was a very odd decision. On the other hand, he had to learn how to tolerate the seemingly endless boredom of school, an equally dreadful task for geniuses and morons alike. His suffering was cut short when he was finally accepted to Harvard at age 12, which he had attempted to do since age 9. He occupied himself during this 3-year wait by checking Einstein's Theory of Relativity for errors and learning foreign languages.

Sadly for William, Harvard was a disappointment. His lack of social graces and athletic abilities, which his father detested, did not endear him to the well-heeled anti-Semitic aristocracy of Harvard. He was treated as a misfit yet shown off like a prize horse. To make matters worse, his father published an essay, "Philistine and Genius (1909), wherein he predicted the coming of WWI, the fall of Europe, the scourge of the Red menace, the evil of growing State authority, industrial greed, the war machine, the dumbing-down of the people due to the education system, and the injustice of the justice system. His essay starts with the premise that "What you [the reader] want is not the training of philistines, but the education of genius.", and is as insightful into the problems the world faces today as it was then, if not more so. Consequently, the powers-that-be, and the media that worked for them, rained down criticism on him. In modern parlance, he was "canceled", and his ideas were labeled as "conspiracy theories", "fake news", and "disinformation". As Sarah described:

> *Boris pulled down upon his stout head, and upon Billy, who was so very young, the anger that comes from hurt pride, and educators, psychologists, editorial writers, newspaper readers, were furious with him, and their fury was a factor in Billy's life upon which we had not counted.*

No doubt, this was a factor in William's rebellious, anti-establishment views and his involvement in a socialist workers' demonstration against working conditions in Roxbury, Massachusetts. The conflict between the crowd and the police turned violent, ending in two police killed and many demonstrators being badly beaten. William was arrested as an inciter and for assaulting a police officer and was sentenced to 18 months in jail, but before he could appeal, claiming he was innocent on both counts,

his parents “kidnapped” (his words) him in order to protect him from jail by putting him in a New Hampshire sanatorium for one year. This marked the break between William and his father.

Prior to being committed to a mental institution to avoid jail, William’s oddball demeanor made him the butt of many cruel jokes intended to humiliate him. This went so far as to involve girls from Rutgers who would pretend to flirt with him simply to make fun of his social awkwardness or write fake love letters proposing marriage. This humiliation was all the more effective as William never understood when he was being made a fool of until it was too late. He was further ostracized by rumors and stories that he suffered from recurrent nervous breakdowns, was deathly ill, and was losing his eyesight due to overstudying. In fact, other than a case of flu, William was never ill, never wore glasses, and never studied, at least not in the traditional sense, as he did not believe that rote learning was of any value. For William, learning was a form of playing.

The hell that was Harvard did not dissuade William from entering Harvard Graduate School to study law, but after he was physically threatened, he decided to take a position at Price University in Texas. It was also here that he wrote his speculative yet scholarly work on Newton’s 2nd law, titled “The Animate and Inanimate”. This brilliant work received no public attention, mainly because William was presented as an unhinged anti-establishment boy wonder that had burned out and never achieved any greatest in the accepted arenas of the day. While William continued to write, he refused to publish under his own name given the stain and prejudice that the media had placed on it, but publishers refused to publish under his pen name, as they knew it was his name that would sell books, not the content.

William concluded that the only way to live a perfect life is to live in solitude, and with this decision, he disappeared from the spotlight. He took on menial jobs and hid his identity. He would later say, “The very sight of a mathematical formula makes me physically ill. All I want to do is run an adding machine, but they won’t let me alone.”

William’s last public appearance was in 1937, when he unsuccessfully sued the *New Yorker* for invasion of privacy[360]. This loss marked a precedent in privacy law, as the judge ruled that once a person is a public figure, they’re always a public figure (vloggers take note).

To this day, the genus of William James Sidis is ignored, eclipsed by the same bottom-feeding yellow journalism that poisoned society 100 years ago, as evidenced by this *New Yorker* description of the article that William sued the *New Yorker* over in 1937:[361]

> *Reminiscent story of William James Sidis, the boy genius who at the age of 11 lectured on the Fourth Dimension at a gathering of about 100 professors & advanced students of mathematics from Harvard University. At the age of 16 he entered Harvard Law School. He attended law school quietly for three years, but his main interest was mathematics. In 1919, he took part in a Communistic demonstration in Roxbury and was arrested for inciting to riot. While out on bail, he disappeared. Since then he has been working as a clerk for a salary*

> *not large enough to subsist him. In 1926, he got out a volume on the collection of streetcar transfers. He has a collection of about 1,600 of them. Today he is living in a hall bedroom of Boston's shabby end, working as a clerk in a business house. Sidis died July 17, 1944. This information from a reader who was doing research on him. She telephoned first on Jan. 24 & then on the 25th, 1990.*

The Work

The book "The Animate and Inanimate" is Williams's most significant work by many. It was published in 1920 when he was 21, which means it was published while he was in the sanatorium. In essence, this book is a speculative, unprovable theory of the reversibility of the Universe and, therefore, the laws of motion, entropy, and time. William was hesitant to publish this work but was moved to after discovering the following quote from Lord Kelvin:

> *It is conceivable that animal life might have the attribute of using the heat of surrounding matter, at its natural temperature, as a source of energy for mechanical effect . . . . The influence of animal or vegetable life on matter is infinitely beyond the range of any scientific inquiry hitherto entered on. Its power of directing the motions of moving particles, in the demonstrated daily miracle of our human free-will, and in the growth of generation after generation of plants from a single seed, are infinitely different from any possible result of the fortuitous concurrence of atoms.* ***~Lord Kelvin***

In other words, the existence of life breaks the 2nd law of thermodynamics or at least appears to. Therefore, there must be some invisible force that the 2nd law of thermodynamics does not apply to, similar in concept to James Maxwell's "demon" described earlier.

William suggests the idea that a reverse Universe would be akin to one's reflection in a mirror, where all details are exactly the same but where the time dimension of reality occurs in reverse order. To be clear, William is referring to a *quantitative* reversal, not a *qualitative* reversal, i.e., 1, 2, 3, 4, 5 becomes 5, 4, 3, 2, 1, not -1, -2, -3, -4 -5.

According to William, it can be proven that all the laws of physics work identically in both worlds, except the 2nd law of thermodynamics or that of entropy. This is the single distinguishing feature of our "forward moving" that makes reality move in the direction it does. This means that, for example, the dissipation of energy as heat, the most dissipated form of energy, in *forward* world becomes the most concentrated source of energy in *reverse* world. This also tells us that in the *reverse* world, all energy will eventually become concentrated into a singularity. In other words, the probability that all energy will ultimately concentrate into a singularity in *reverse* world is the same probability that a bowling ball will scatter the pins on impact in *forward* world. William goes on to speculate that, if this is the case, then there must be a time in the past when all energy was concentrated into one point or source. Today we know this as the Big Bang and black holes.

The idea of black holes goes back to astronomer Karl Schwarzschild who came up with the concept of what would be called “frozen stars” in 1916 after reading Einstein’s *Theory of Relativity* and warped space. William, 4 years after Schwarzschild’s hypothesis, arrives at the same conclusions using only the 2nd law of thermodynamics as evidence and goes on to describe the expanding Universe 2 years before Friedmann theorized that concept and the Big Bang, or what he called the *Great Collision*, 7 years before that idea was conceived in 1927 by Lemaître.

William then goes on to conclude that the Universe must have been created by two “halves” of the Universe, each a Universe unto itself, both at rest and at 0° in temperature, colliding into each other, and it was at this point only that the 2nd law of thermodynamics came into effect. While this is not how modern science understands the Big Bang, his ideas were based purely on reason and came close to what we understand today. Given the questions that still remain unanswered, who can say that he won’t be proven correct in the future? It is also interesting that his ideas are perfectly in-line with the tholonic concept of creation being two opposing forces in its initial and all subsequent creation.

William posits that within this Universe, there exists an instance where the 2nd law does exist in reverse. This is not impossible, as the 2nd law is not actually a physical law but rather a highly probable statistical result, and therefore, not being a law, is capable of being violated. Where such an inversion of the law might exist, it would reverse entropy, concentrating energy rather than dispersing it. William explains how and why this is a reasonable assumption and even gives an example of how we might recognize such a process. Today we know at least one way that can actually happen[362], although how it happens is probably a bit different from the way William suggests.

Appendix L: The Thologram and Metaphysics

Inner workings of Awareness and Intention

Tholonic Divinity

The tholonic claim is that our understanding of reality is determined by the context of our understanding of the universally consistent laws. Because of this, we will see the same patterns through these different cultural lenses.

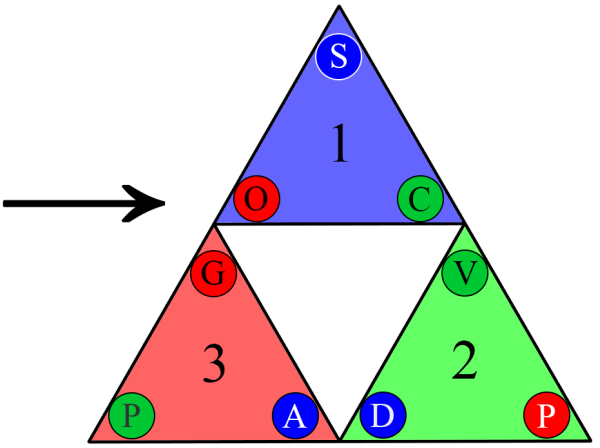
Prior to modern science, it was religion that provided that lens, and over thousands of years, inspired and brilliant minds studied and philosophized on the nature of these god-given tenants in an attempt to unveil the mysteries of God, the Universe, and Life.

Not surprisingly, we can see several parallels between the ancient understanding of God, the creations of God, and the thologram. One of the more obvious parallels can be seen in the traditional and current Christian model (the Jewish model is similar but not exactly the same) of the hierarchy of Christian saints composed of 9 angelic choirs made up of 3 spheres of responsibility, with each sphere having 3 classes of angels.

The 9 Choirs of Angels

3 Spheres	Class	Function
1st Sphere The domain of God	**The Seraphim**	*6-winged caretakers of God's throne and the highest angelic authority.*
	The Cherubim	*4-winged, 4 faced guardians of God's Sancuaries.*
	The Ophanim	*The many-eyed, often enflamed, wheels of the Cherubim.*
2nd Sphere The domain of Creation	**Dominions**	*Responsible for making the commandments of God known.*
	Virtues	*Responsible for running the Universe, nature, and the elements.*
	Powers	*Warrios angels that combat evil with good.*
3rd Sphere The domain of Earth	**Archangels**	*Responsibel for manifesting God's will.*
	Principalities	*Guardians of leaders, towns, the "watchers", always reporting back and influencing below.*
	Guardian Angels	*Pesonal guardian angels (of true believes only).*

This is remarkably similar to the tholonic model but limited to a single tholon.



We can even see how the class of angles fits neatly into the tholonic trinity of *Negotiation/Definition/Contribution* (or *Balance/Limitation/Form*):

- *Negotiation/balance* angels are tasked with care-taking, delivering, and manifesting the will of God.
- *Defining/limiting* angels are tasked with guarding, operating, and watching God's creations.
- *Contributing/form* angels are the wheels, the warriors, and humanity's personal guiding angels.

Even more astonishing is that some of the most significant religious philosophers have described this angelic hierarchy in ways that sound perfectly tholonic. For example, the most respected and influential philosopher and Torah scholar of the Middle Ages, Maimonides (Moses ben Maimon, 1138–1204 CE. Spain), in his book "Guide of the Perplexed", explains at length how angels are forms of intelligence, and what is referred to as "angels" are not only the forces and laws of nature, but the forces of imagination, ideas, and even the mind of man. Furthermore, reality as we know it is formed by these invisible intelligences as well as the intelligence of Man. He supports his arguments with the ideas of Aristotle, Plato, and even the angles themselves as they are portrayed to conclude that:

> *Thus, the Sages reveal to the aware that the imaginative faculty is also called an angel, and the mind is called a cherub. How beautiful this will appear to the sophisticated mind – and how disturbing to the primitive."*

He doubles down on his heretical claims by stating that reality is controlled by the laws of physics, not by God's will and that most miracles never happened. Perhaps his most egregious claim was that divine providence is non-supernatural and is not given by God's grace but achieved by the perfection of the intellect... and this was 800 years ago!

Of course, telling people that angels are anthropomorphized constructs of forms of intelligence and that people were responsible for their own divine providence did not go over so well. His book was quickly condemned and burned by both Jews and Christians.

The most fundamental tenet of the Judeo-Christian god like a tholonic description:

> *Bible: "For in Him all things were created: things in heaven and on earth, visible, and invisible… all things have been created through him and for him". Colossians 1:16-17*
>
> *Tholonic: "All things exist within the thologram, from concepts to forms. All things come into existence through the movement of energy for the sole purpose of attaining balance."*

I want to clarify that this is in no way meant to disparage, disrespect, or even criticize religious beliefs. The tholonic position is all views, beliefs, and perspectives are equally valid to the degree that they are sustainable, and with each perspective comes certain understandings and limitations. The significant difference between the tholonic and religious models is a duality of good/evil vs. the duality of nothing/something. While Judeo-Christianity has a concept of the "will of God", the thologram has the concept of Awareness and Intention. The thologram even recognizes an ultimate creator: the Awareness and Intention that is the source of all energy. In fact, if you replace the concept of "God" with "energy", the "will of God" with "Intention", and "tholonic intelligence" and "divine beings" with "tholons", both models appear remarkably similar.

The 1st tholon within which all others are created could be considered as the God Tholon, but that tholon itself was created by Awareness and Intention, which has no traits or characteristics other than A&I. Any concept of a god or divine being that has any traits whatsoever, other than A&I, would by definition be a child tholon that has its own tholonic intelligence and therefore has an agenda of some sort as it requires its own child tholons to exist as well as having to co-exist with its peers and in accordance to its parents context.

Personal Experiments

As was briefly alluded to earlier in reference to the Taoist *Neidan* meditation practice, tholonic concepts exist in ancient meditations as a way to connect with the *inner energy* of the spirit. This inner energy has many names, such as; spirit, chi, qi, and prana. Tholonically, this *inner energy* is the same energy we see daily in the material world, but in a different scope and context. As all energy is Awareness and Intention, the scope of this energy in meditation is also awareness and intention, but within the contextual limits of human consciousness. We'll simply refer to this *inner energy*, this instance of A&I in the context of human consciousness, as "a&i".

There are many dimensions, techniques, and intentions when it comes to meditation. These can range from sitting to spinning in circles for hours. From a tholonic perspective, we want to look at only the single dimension of how mediation can alter the entropy of this *inner energy*.

Mediation techniques of stilling the mind, disconnecting from the outer world, and emptying oneself entirely are entropy-lowering techniques. These meditations reduce the number of microstates the mind can explore, creating a less distributed, more focused mind. This is equivalent to returning the mind to a state of singularity, a state of much lower entropy.

Meditations that require concentration and focus, such as the meditations of complex mandalas that contain geometric patterns, symbolism, and layers of meaning, are specifically meant to add more microstates for the mind to explore, thereby enhancing the distribution of energy, leading to a more balanced state.

For example, in Buddhism, there are 2 types of meditations; *Vipassana* ("insight") and *Samatha* ("tranquility").

Vipassana ("Insight") is a state in which the mind is singularly focused on what is happening as it happens and, through the use of concentration of awareness, gradually chipping away at the illusion of this temporary material world that separates the mind from the eternal truth of reality. The technique requires attention to mindful listening, seeing, self-reflection, and testing, making it an entropy-increasing practice. As this involves the dispersion and decoherence of energy, there is a greater demand on the a&i (i.e., energy), but it coheres the mind.

Meditations that involve physical exertion and a heightened awareness of one's surroundings, such as spinning (e.g., Whirling Dervishes) or even running, which can induce a transcendental state, are Vipassana-ish in nature.

Samatha ("tranquility") is a state in which the mind is brought to rest, focused only on one item, such as a prayer, a light, or an image, and not allowed to wander. This results in a state of rapture, which ends when the meditation is over. Although this is a temporary state, it is beneficial to one's state of being and has low energy requirements. This is an entropy-decreasing practice, as it eliminates many microstates that can dissipate one's awareness, thus increasing the coherence of one's a&i (energy). Meditations that induce trance-like states are *Samatha-ish* in nature.

Samatha is the more common form of meditation among Buddhism and other disciplines as well, but *Vipassana* is the oldest of Buddhist meditations, dating back to the days of Buddha himself (563 to 483 B.C.), and was described in a discourse in the *Satipatthana Sutta* ("Foundations of Mindfulness") written by Buddha.

One path leads to the Beginning, and one path leads to the End, which, from an energy perspective, are 2 views of the same "location", and achieving one state will ultimately lead to the other.

This “the end is the beginning, the beginning is the end” idea is metaphorically similar to how new Big Bangs (singularities), and the new universe they create, occur within the “nothingness” of black holes (“nothingness” in the sense that no-thing exists in a black hole, as there is no-thing or no-one to observe what is in a black hole, then everything is a just a bunch of un-collapsed wave-functions)

Tholonic Intelligence as Gods

If we look at the most ancient of religious texts we see very tholonic concepts wrapped in the anthropomorphic ideas of divine authority. For example, in the original Old Testament and the Torah, we see that the term “Elohim” to mean God, as in “In the beginning God (Elohim) created the heavens and earth”. While Elohim is considered to be singular, most likely due to Judaic and Christian concept of monotheism, the word is, grammatically, a masculine plural form of the noun “gods” or “deities”. This plurality is (often) considered to be a plural of majesty, similar to the Royal “we”, as the “Most High” god includes with it all other god and deities, who when the singular most high god speaks, he speaks for all, the Elohim. That singular god was known by the masculine singular form of “Elyon”, which translates to “El most high”, and “El” was the supreme creator god of the Canaanites.

Without getting into the linguine of ancient biblical translations and interpretations, the ancient legends state that Elyon divided the nations and gave Israel (a word that itself translates to “El’s Glory”) to his son, Yahweh. Hence, Yahweh is the god of the Israelite, but not the “Most High” god, that being Elyon.

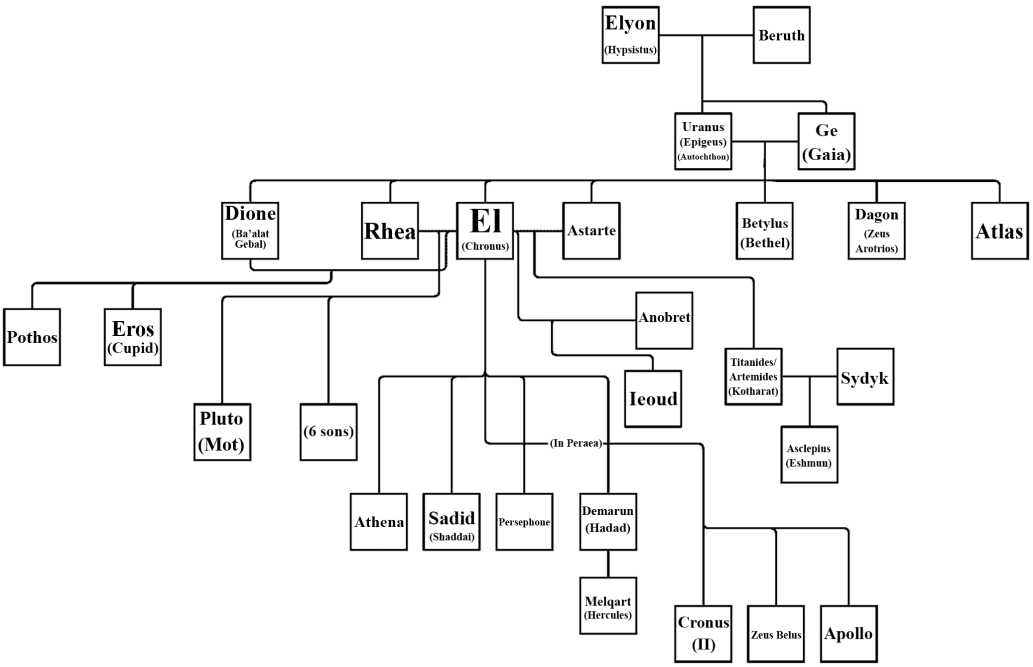
So, we have El, the “Most High God”, which encompasses the plurality of all other gods and deities, which is known as Elohim. El had 70 children, each son to be a guardian over 70 nations. Yahweh was the son who was the guardian of Israel, and Jesus was the son of Yahweh.

OK, that the general outline of history. Of course, there are numerous variations of this outline depending on source material, interpretations, beliefs, religious agendas, all exacerbated by the fact that everything we know of the ancient past is puzzled together from only a few remaining pieces of evidence, legend, and culture from 5000 years ago, not to mention the evolution of these ancient concepts have undergone in those 5000 years. An example of this evolution is how El, Elohim, and Yahweh have become synonymous with each other[363].

It’s also worth noting the parallels of the Canaanite pantheon with the Ancient Greek Pantheon, for example, we see in the writing of *Sanchoniatho the Berytian* (13th c. BC) that:

> *“Elioun, ‘who is called the Most High’, and who became the father of Epigeios (‘the One who is above the earth’), later called Ouranos: the latter married his sister Ge (the earth) and begot four sons, the first of whom was called Elos, also called Kronos.”*

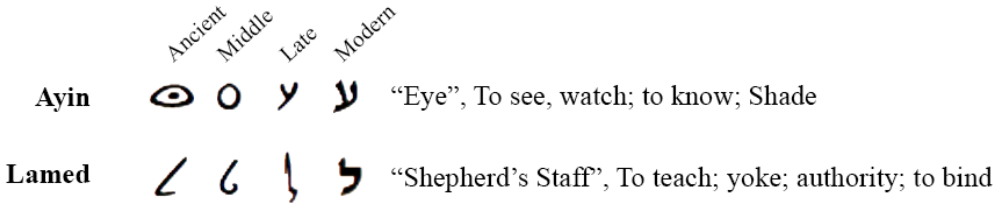
And we can see just how closely these 2 divine hierarchies reflect each other in the charts below ascribed to *Sanchoniatho*:



If it is not obvious already, let's point out the similarities with the thologram. Elyon, who was not created by anything and which contains within it all things, is the primary tholon. That tholon contains a plurality of partons, which are themselves tholons with partons. Elyon describes the parent tholon from which all is created within, and Elohim describes the same tholon but as a plurality of the partons. Just as an archetype will, or perhaps must, inevitably instantiate, here, too, there is an instantiation of "The Most High" in Jesus.

Each son of Elyon was to watch over their nation, which describes the relationship between the parent tholon and its partons as the survival and health of the parent tholon depends on the survival and health of the parton.

The name "El" is composed of 2 ancient Semitic characters, *Ayin*, and *Lamed*, which were originally pictographs based on the "eye" and "shepherd's staff", representing the concepts of "To watch, to see" and "to guide". Together, they clearly represent the ideas of a shepherd watching over and controlling his flock.



The concept of “to see, to watch, to know” is synonymous with “to be aware of”, i.e., am expressions of awareness. Guiding, teaching, binding, or to presume authority, are also very clear intentions. This strongly suggests that “El” is an instance of awareness and intention, and “Elyon” is the “Most High” Awareness and Intention [364].

This concept of Guider and Watcher is repeated throughout the Jewish, Islamic, and Christian teachings in imagery, prayer, and messages such as ’The Lord is my shepherd” meme. Tholonically, “El” and “Elyon” are tholonic intelligences with their own particular expressions of Awareness and Intention.

It’s no wonder that the Canaanite “El” equates to the Greek “Cronus”, which is the Roman “Saturn”, as the metaphysical or spiritual significance of Saturn is one of restrictions and limitation for the purpose of achieving maturity, responsibility, discipline, and stewardship, bringing meaning and structure to our lives, with a healthy dose of discipline punishment, karmic justice, and well as being the god of time.

Tholonically, this is an instance of the *Definition/Limitation*. However, the creator of the Universe and all things is a “Most High” instance of El. This would certainly explain why the Old Testament god was the way he was, but we see this same pattern in the thologram as the first creation of the 0-dimensional dot of A&I is *Definition/Limitation*. This is the “Elyon”, and all the subsequent instance of *Definition/Limitation* in the children or the “El’s”. The *Contribution/Form* of this *Definition/Limitation* is the material instance of the archetype, which, as we previously mentioned, would be the incarnate “Most High”, which describes the concept of a Messiah which is core to many religions. The concept of an incarnate god was originated in Zoroastrianism as the savior who will rid the world of evil (the Saoshyant). This concept was adopted by Judaism (Mashiach), Christianity (Christ), Islam (Isa Masih), Buddhism (Maitreya), Hinduism (Kalki), Taoism (Li Hong), and other belief systems.

Jupiter, on the other hand, was the god of sky and thunder, and the Roman version of the Greek Zeus, who was the ruler, protector, creator of humans and kings of the gods, a title he earned by freeing his brother from the stomach of Cronus/Saturn. Jupiter/Zeus is also the Roman/Greek versions of the Canaanite Ba’al-Hadad (a.k.a. Ba’al), the god of fertility and life, but also at one time a god of war and storms.

Historically, Ba’al is a word used to indicate “Lord”, and there are many Ba’al’s. There is no good archaeological evidence to suggest that Ba’al-Hadad was involved in child sacrifices. However, Ba’al-Hamon of the Phoenician North African colony of Carthage *did* receive burnt child offerings, and it was this Ba’al that the Greeks associated with Cronus. There was also the Ba’al-Zebub, god of the Philistine city of Ekron, and from which we get the word “Beelzebub”, meaning “Lord of the flies”, which was a nice way of saying “Lord of shit”. Many cities had their own version of Ba’al. Baʿal Berith was the god worshiped by the Israelites when they “went astray”. The list goes on, but the general concept of Ba’al is a deity that protects community, food, and security, hence, a god of fertility, rain (which came from storms in that area of the world) and war. How that concept instantiated across cultures varied from temple orgies to burnt sacrifices. It is this concept of Ba’al that we are referring to when we use the word, and not any particular cultural instance. The same is true for “El”, Elyon”, Yahweh, etc., as the Israelites also practices burnt animal sacrifice, and as we know from the Bible, human sacrifice of children.

In the Jupiter/Zeus/Ba'al path the follower hopes to ensure fortune, success, growth, luck, etc., by pleasing the gods through gifts and adoration. This led to a culture of gratification, vanity and personality worship. Ba'alism culture had degenerated to Sodom and Gomorrah levels. Here is a common letter sent from a Canaanite mayor to the ruling Egyptian Pharaoh who demanded empty platitudes. Imagine the type of culture where this sort of grovelling, humiliation, and self-disrespect was not only normal, but expected from your superiors:

> *To the king, my lord, my god, my sun … I fall at the feet of the king, my lord, seven times and seven times. I am the dirt under the sandals of the king, my lord. My lord is the sun who comes forth over all lands day by day, according to the way of the sun, his gracious father, who gives life by his sweet breath and returns with his north wind; who establishes the entire land in peace, by the power of his arm: who gives forth his cry in the sky like Baal, and all the land is frightened at his cry. The servant herewith writes to his lord that he heard the gracious messenger of the king who came to his servant, and the sweet breath that came forth from the mouth of the king, my lord, to his servant—his breath came back! Before the arrival of the messenger of the king, my lord, breath had not come back; my nose was blocked. Now that the breath of the king has come forth to me, I am very happy.*

and…

> *If the king wrote for my wife, how could I hold her back? How, if the king wrote to me, "Put a bronze dagger into your heart and die," could I not execute the order of the king?*

In the Saturn/Cronus/El path, while the God of Abraham also demanded praise, sacrifice and absolute commitment, he also demanded unrelenting discipline.

This is clearly stated in *Hebrews 12:4-11*

> *In your struggle against sin, you have not yet resisted to the point of shedding your blood.*
>
> *And you have forgotten that word of encouragement that addresses you as sons: "My son, do not make light of the Lord's discipline, and do not lose heart when he rebukes you, because the Lord disciplines those he loves, and he punishes everyone he accepts as a son."*
>
> *Endure hardship as discipline: God is treating you as sons. For what son is not disciplined by his father? If you are not disciplined (and everyone undergoes discipline), then you are illegitimate children and not true sons. Moreover, we have all had human fathers who disciplined us and we respected them for it.*
>
> *How much more should we submit to the Father of our spirits and live! Our fathers disciplined us for a little while as they thought best; but God disciplines us for our good, that we may share in his holiness.*

> *No discipline seems pleasant at the time, but painful. Later on, however, it produces a harvest of righteousness and peace for those who have been trained by it.*

William F. Albright, the American archaeologist, biblical scholar, philologist and considered one of the 20th century's most influential American biblical scholars, reiterates this idea more clearly:

> *It was fortunate for the future of monotheism that the Israelites of the Conquest were a wild folk, endowed with primitive energy and ruthless will to exist, since the resulting decimation of the Canaanites prevented the complete fusion of the two kindred folk which would almost inevitably have depressed Yahwistic standards to a point where recovery was impossible. Thus the Canaanites, with their orgiastic nature-worship, their cult of fertility in the form of serpent symbols and sensuous nudity, and their gross mythology, were replaced by Israel, with its pastoral simplicity and purity of life, its lofty monotheism, and its severe code of ethics.* ***~W. F. Albright, "From the Stone Age to Christianity", p. 281.***

These ideas are further explained in the words of Eugene H. Peterson[365], an American Presbyterian minister, scholar, theologian, author, poet, and holder of number academic degrees and honorary doctorate degrees.

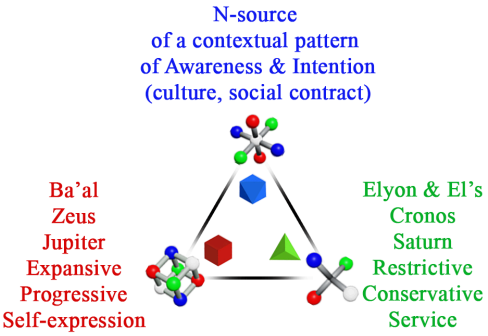
> *While the prophetic accusation of "harlotry" had a literal reference to the sacred prostitution of the Baal cult, it extended its meaning into the entire theology of worship. It referred to worship that sought fulfillment through self-expression, worship that accepted the needs and desires and passions of the worshiper as its raw material. "Harlotry" is worship which says, "I will give you satisfaction. You want religious feelings? I will give them to you. You want your needs fulfilled? I'll do it in the form most attractive to you."*

In contrast…

> *Yahwism established a form of worship which was centered in the proclamation of the word of the covenant God. The appeal was made to the will. Man's rational intelligence was roused to attention as he was called upon to respond as a person to the will of God. In Yahwism something was said–words which called men to serve, love, obey, act responsibly, decide.*

In many ways, we can see this polarity in modern politics and culture as the division between the the progressive, permissive, hyper-liberal, woke, left-leaning, post-modern side and the libertarian, traditional, conservative-leaning , classical side. In the 60s this would have been something like the Hippies/free-love vs. the John Birch Society.

In any case, we end up with something like this:



However, the broader perspective is recognizing the context of the A&I from which both of these expressions emerge transcends all gods and all politics, and from that perspective, a stable balance between the poles can emerge, in both beliefs and practice.

I Am

This simplest of insights, "I am" vs. "I am not", or "is" vs. "is not", is at the foundation of everything man does, think, believes, and knows, so it is worth exploring this concept to understand it better. If we go back 6,000 to the dawn of the modern human, we are going back to the beginning of Western Judeo-Christian concepts. Immediately we are challenged with the obfuscation of language. This is best represented in the seminal message God gave to Moses at the Burning Bush.

> *(3:13) "But," said Moses to God, "if I go to the Israelites and say to them, 'The God of your ancestors has sent me to you,' and they ask me, 'What is his name?' what do I tell them?" (3:14) God replied to Moses: "I AM WHO I AM". Then he added: "This is what you will tell the Israelites: 'I AM has sent me to you.'".*
> ***~Exodus***

The most important detail about this line is that it can only be understood if read in Hebrew. We don't know what language the message was delivered in or if Moses even knew Hebrew. All we know it our current sources were written in Hebrew 1000 years after Moses. The claim that the message was delivered in Hebrew because God only spoke in Hebrew is suspect. In any case, the languages of the day, Aramaic, Canaanite, Phoenician, are similar to Hebrew.

In Hebrew, the root word that means "to exist" or "to be" is HWH (*Ehyeh*, הוה). Adding an A (**א**) at the beginning makes it *1st person*, as in "I exist". Adding a T (**ת**) makes it *2nd person*, as in "you exist", and adding a Y (**י**) makes it *3rd person*, as in "he exists".

Here, God tells Moses his name is "I AM WHO I AM" (*Ehyeh-Asher-Ehyeh*, אהיה אשר אהיה), which can be interpreted as:

I will exist because I will exist I exist because I exist I am who I am I will be who I will be I am that which exists

It is not a matter of choosing which interpretation is correct. Given that Hebrew only has tenses for *finished* (perfect) and *unfinished* (imperfect) and no *future* or *past* tenses, all these (and more) interpretations are simultaneously correct.

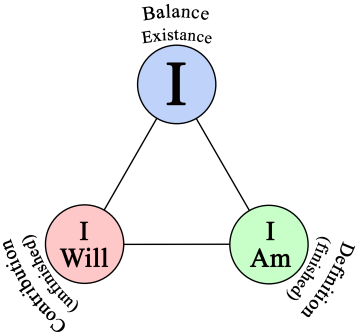
But God also said, "Thus you shall say to the Israelites, 'I AM has sent me to you.'". "I AM" here is spelled like YHWH (*Yih'weh*, יהוה, YHWH), which is the *3rd person* form of "to be" (HWH, *Ehyeh*, הוה) . This translates to "He exists" *and* "He will exist". It is unclear if the voice of *Ehyeh-Asher-Ehyeh* was speaking as the messenger for the even greater God of "He Is" or, as pointed out by Jaynes, refers to itself in the *3rd person* because human consciousness at that time could only conceive of a god as someone/ something outside of themselves, a projection of the "I Am" concept.

In either case, we have instances of Awareness (I am, I exist) and instances of Intention (I will). This correlation fits so nicely that we could say that *finished* is a description of *Awareness*, in that awareness, in its pure form, is finished, perfect, in the present. There is nothing for *Awareness* to "do" other than "to be". *Intention* is unfinished, a work-in-progress, the future, something that requires "work".

After thousands of years and thousands of volumes of opinion, doctrine, and religious law, and despite the deliberate hiding, misspelling, encrypting, and misinterpreting of the name of God (as it was forbidden to be spoken and often forbidden to be written), there is still heated debate as to the "real" and/or "secret" significance of these words.

And if this subject wasn't already shrouded in the mystical symbolism of Moses's isolated vision, it has been orally passed on for centuries before it was translated from Phoenician to Hebrew to Greek to English and dozens of other languages, none of which hold the same significance as the language of Moses. For example, historians say that the Phoenician alphabet evolved out of symbols for things like fish (𐤍), eye (𐤏), tooth (𐤔), weapon (𐤆), etc., and even though the symbols and order are similar to Hebrew (and Greek), the legend is that Hebrew came from the words that were written with black fire on white fire in the presence of god, and that these words are the Torah as well as all the names of God, and so powerful with this language that, as the legend goes, the 1st letter of the Hebrew alphabet, ALEPH, was created by God opening his mouth to speak, but even that was so overwhelming it caused the people to fall to the ground (is this why the word "Aleph" is the joining of 2 words, "al", meaning "god" (i.e. the god of Israel. The etymology is unclear, but not to be confused with "El", the generic Semitic word meaning "god", although it seems likely they are connected) , and "p", meaning "mouth"? Aleph=אלפ God=אל Mouth=פ). The cultural significance of letters, words, and sentences will differ dramatically even between these similar languages.

The other reason is to show how tholonic concepts find form in not only scientific understanding but religious and spiritual beliefs and even language itself. Any belief, including scientific, that advances dogma and confusion of any kind is a belief that is detrimental to understanding the nature of reality, but such beliefs have existed for thousands of years and appear to be very sustainable. What follows is a simple description of the tholonic concept that is linguistically and conceptually compatible with many belief systems and which may shed light on their cryptic symbolism.



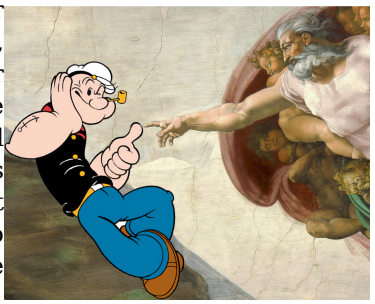
What? That!

You enter a restaurant, and the waiter asks, "**What** would you like?". You reply, "I'll take **that**." pointing to a plate of Rocky Mountain Oysters. "What" is defining the context and is synonymous with "anything that" (with the implied "is on the menu"). When "what" is used as a *predeterminer*, such as "What a great idea!", it is still referring to the larger concept of "great idea" and is stating that the specific idea is worthy of being a member of the "great idea" category. Any use of "what" will always refer to some context, either explicitly or implicitly; Bob: "I have money for the meter, so we can park here." Carol: "I have six toes." Bob: "What!?".

The word "that" is, grammatically, a *determiner* and a *relative pronoun* because it always refers to something specific that is contextually relative and implies a plurality of potential "that's". There's no need for the waiter to ask what you want or for you to say, "I'll have **that**" if the only thing that they serve is Rocky Mountain Oysters.

"I Am **That** I Am" is stating that the existence of "I Am" is, and only is, awareness of "I" and that the entirety of that awareness is, and only is, the singularity of that awareness. There is no context for that which is "I Am" other than "I Am". It is perfectly self-referential as "I Am" consists only of that singularity that is "I Am". On the other hand, "I Am **What** I Am" means that the entirety of "I Am" is the sum of its parts. Even if those parts are instances of "I Am", it is not a singularity because "what" explicitly refers to a plurality in contrast to the singularity of "that".

Tholonically, "I Am **That** I Am" describes an instance or a concept from the perspective of a tholon as a whole, a *holon*. "I Am **What** I Am" describes an instance or concept as a collection of parts, or *partons*, that make the whole. It is the difference between the creator and the created (e.g., God and *Popeye the Sailorman*, who's fond of saying, "I yam what I yam, and that's all what I yam"). In the thologram, as the parts are identical to the whole, we can say that the parts most definitely are made in the image of the whole.



There is only a single instance where the *holons* and *partons*, the context and contents, are identical, and that is the initial instance of the trigram. This is the only valid instance of "I Am **That** I Am", and everything that follows is "I Am **What** I Am". The

Aramaic name of God can be interpreted as either as we are being told that Jehovah is both the creator and the created. Ironically, this is antithetical to the Abrahamic concept of a god, which believes that the creator and the created are distinctly and vastly different.

The thologram is not a religious or spiritual model, even though it seems to border on those areas. However, it does apply to religious and spiritual models. For example, we see several tholonic concepts in several creation stories, but, tholonically speaking, the biblical god could not be the A&I singularity as it is clearly stated in Genesis 1:26 "*Then God said, 'Let Us make humans in Our image, according to Our likeness'*", which tells us that the tholon from which creation sprang was a plurality, i.e., partons. The tholonic view is that awareness and intention are inherent in all existence, suggesting that the god of the Bible was a tholonic intelligence establishing its own sustainability, which is precisely what we would expect to see. This does diminish the religious concept of God in any way; rather, it is meant to expand the understanding of tholonic intelligence.

Reinventing "I am" in the Age of Enlightenment

Descartes had a similar understanding of this concept when he coined "Cognito, ergo sum" (*I think, therefore I am*)[366]. Unfortunately, qualifying "I Am" with "I Think" could easily be perceived as intellectual hubris or self-defeating and dangerously ignorant. While Descartes was a brilliant mathematician, scientist, philosopher, and metaphysician, we have to understand his worldview in the context of 17th century Europe. This was before Newton and even before the *Age of Enlightenment*, which many historians consider having begun when Descartes originally coined this phrase in his publication of "*Discourse on Method*". The modern Western concepts of mind, consciousness, and thought were only beginning to hatch, and they would quickly grow to be recognized as the defining quality that not only separated man from beast and made man a divine creature. We can't just blame intellectual arrogance that the intelligentsia of the day saw themselves closer to, and favored by, their all-powerful Christian sky-god, as this pitfall comes packaged with the ability to say "I", but it certainly played a role in the world view of those who ushered in the Age of Enlightenment. The ability to have the concept of "I Am" was only possible for those that possessed consciousness and rationality, at least in the way these concepts were defined later by Freud, who claimed that consciousness and rationality are not only ego-centric; they are the source of the ego.

Being the pioneer that Freud was, we should view his theories as "working drafts" of psychological theory, especially in light of the cultural revolution fueled by madness and modernity in 1900 Vienna. The seeds of this revolution were being sewn 50 years earlier in Leipzig, Germany when Gustav Fechner's theories created what would later become *physiological science*, and in 1879, when William Wundt founded the premier first laboratory for psychological research, also in Leipzig, and which was succeeded by the empirical psychology of Ferdinand Ueberwasse. It was this intellectual garden of the rigid, disciplined, demanding, competitive, imperialist German culture that was

being strictly enforced by the somewhat tyrannical “Iron Chancellor”, Otto von Bismarck, that nourished the theories of Freud, Jung, Adler, Titchener, and the other midwives of modern psychology that quickly spread throughout the western world. It was also this view of humanity that further developed the concept of *self* as “that which thinks” that was initially introduced by Descartes (1644) in his “*Principles of Philosophy*” into the far more encompassing and modern concept of *self* as the “*totality of the individual, consisting of all characteristic attributes, conscious and unconscious, mental and physical*” [367]. This wholly materialistic concept rejected all introspective ideas of imagery, memory, mind, consciousness, etc., as being nothing more than materialist side effects. This concept of the self as a material, mechanical byproduct of “nature and nurture” (genetics and training) paved the way for behavioral psychology as a way to “predict and control animal behavior”, producing sociopathic luminaries such as B. F. Skinner, Ivan Pavlov, and the man credited as the founder of behaviorism, John B. Watson who, in addition to terrifying children to test his theories, proclaimed in his 1913 paper “*Psychology as the Behaviorist Views It*” [368]:

> *Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in and I’ll guarantee to take anyone at random and train him to become any type of specialist I might select—doctor, lawyer, artist, merchant-chief, and, yes, even beggar-man and thief, regardless of his talents, penchants, tendencies, abilities, vocations, and race of his ancestors.*

John B. Watson went on to become the president of the American Psychological Association.

While behaviorism is still alive, well, and growing, the broader post-behaviorism ideas of Cognitive Behavioral therapy that formed in the 1950s and 1960s have also taken center stage.

The tholonic view is that *self* is a construct that reflects where in the hierarchy of archetypes one’s awareness is anchored. What is commonly called *self* is a particular instance of energy in a specific context. This makes everything that exists a type of *self*, the only real difference being that the concept of *self* can only exist as an extension of “I am”. The energy that launches rockets and the energy that moves your arms are the same, only in a different form and context. Remove all context, and there is only A&I. Unlike the psycho-spiritual axiom that there exists a “true self” for each individual, the tholonic view is that there are a number of embedded archetypes an individual instance can “realize”. A hyper-simplified example of embedded archetypes is something like:

- I am
- I am a living being
- I am a mammal
- I am a human
- I am an Asian human
- I am a female Asian human
- I am an old female Asian human
- I am a rich old female Asian woman

- I am a widowed rich old female Asian woman
- I am a widowed rich old female Asian woman living in New York City
- I am a widowed rich old female Asian woman living in NYC with gout

This list continues until we get to the “bottom”, a set of numerous archetypes or attributes from numerous branches of hierarchies that do not (yet) have any sub-archetypes. DNA is a good example of an archetype in a biological hierarchy that has only a single instance. Other hierarchies could be location (not necessarily limited to the 3 dimensions), cognitive changes (beliefs, ideas, knowledge, understanding), and so on. Tholonically, for any instance, there are many types of embedded archetypes, all of which interact with others, creating new archetypes which also interact and create, ad infinitum.

Our erroneous concept of self has its roots in Judeo-Christian and Islamic thinking, which goes back 6,000 years, so it is only natural that the great thinkers of the dominant Western culture over the last 400 years applied their genius within that context. This is not meant to pick on Judeo-Christian concepts, as many other systems had similar concepts, but the Judeo-Christian model dominated. Obviously, the idea and model of *self* works, but it is ultimately unsustainable as it dis-integrates the whole of which the individual *selfs* are a part of, thereby reducing the efficiency, stability, and balance of the whole. Eventually, the “whole” (i.e., current form of humanity) will cease to exist, or the concept of the “self” will adapt and change, probably as a result of *evolutionary suicide*, i.e., catastrophic changes caused by the intelligence of the “whole” in an attempt to self-correct.

With this historical context in mind, we can recognize that it is unreasonable to suggest that conscious and rational thinking is ego-centric. Still, it is not unreasonable to see how the concept of “I” is a prerequisite to “I Think”, and, having such a concept, it would be natural for followers of a demanding, judging, and punishing god to consider themselves, their *self*, “special”, “chosen”, and/or “better”. While consciousness and rationality are not ego-centric, that does not mean that conscious, rational humans are not egotistical and self-serving any more than the benefits of fire does not mean it won’t do a lot of damage if uncontrolled.

It’s not surprising then that for a devout 17th century Christian, which includes most, if not all, the great minds of modern Western culture, the concept of “I think” and “I Am” were essentially synonymous. Thinking is what made man superior, and they had a divine right, and even a divine duty, to act superior, as their god commanded that:

> **Be fruitful and multiply and fill the earth and subdue it and have dominion over the fish of the sea and over the birds of the heavens and over every living thing that moves on the earth.* ***~Genesis 1:26***

For these people, that which did not have the concept of “I” was no more useful than however it was judged to be useful by man. “I think therefore I am” is simply a contextually abridged version of “I am, therefore I am”, but it does raise the question: is reason the modern-day voice of the gods? Were the ancient voices of the gods an early instance of reason?

While the thologram has no concept of a divine creator (beyond that of a 0-dimensional dot of A&I in an infinite nothingness), it does have a concept of a hierarchy of intelligences that have awareness and intention. From the tholonic view, the epiphanies of Moses and Descartes were due to the intentions of a greater intelligence to instantiate itself, but not simply *a* greater intelligence, but many greater intelligences that are constantly in a stage of negotiation via conflict and cooperation

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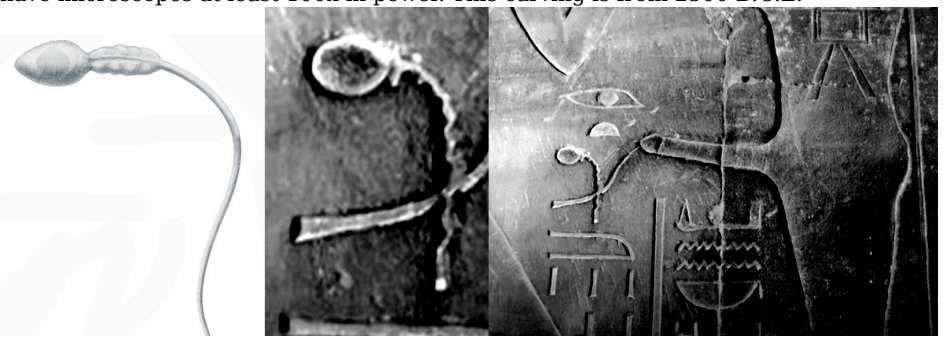

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85. Based on the fact that the brain burns ~13 calories an hour, and intense thinking only uses 5% of that energy, so 13×200 hours a year=2,600 calories, and 1/2 cup of tuna salad is 700 calories.↩

86. Add protein to your diet, eat whole, single-ingredient foods, avoid processed foods, limit your intake of added sugar, drink water, drink (unsweetened) coffee, supplement with glucomannan, avoid liquid calories, fast intermittently, drink (unsweetened) green tea, eat more fruits and vegetables, count calories once in a while, use smaller plates, try a low-carb diet, eat more slowly, add eggs to your diet, spice up your meals, take probiotics, get enough sleep, eat more fiber, brush your teeth after meals, combat your food addiction, do some sort of cardio, add resistance exercises, use whey protein, practice mindful eating, focus on changing your lifestyle.↩

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89. Lee Smolin, a theoretical physicist and founder of *Perimeter Institute*, and one of the most innovative theoretical physicists in the world, refers to Roger Penrose as someone who "is the most important physicist to work in relativity theory except for Einstein. He is one of the very few people I've met in my life who, without reservation, I call a genius."↩

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100. Interestingly, there is a relatively unknown young man, Matias De Stefano, who was born in 1987 in a small town outside of Buenos Aries, Argentina, where he still lives, and who claims that not only was he born with full memory of his existence prior to being born, but that his “job” in his pre-incarnate reality was that of an “information specialist” or “librarian” of sorts, collecting, managing and disseminating information from all realities and dimensions. He claims he has returned to earth to finish a mission he began thousands of years ago but failed to complete. Whether one believes his claims or not, it is hard not to be impressed with his detailed, clear, rational, and somewhat technical explanation regarding the structure and nature of reality. He is mentioned here because, coincidentally, he explains: *“The 8th dimension is where you can see everything from one spot. The 8th dimension has the information of everything, of every second over millions of years, from every perspective of the universe”.* For what it’s worth, he also says each dimension has its own form of technology, and the 9th dimension is a black hole, *“The place and time where there is no place or time”*, and the last dimension that exists in the physical reality. Theosophists and anthroposophists call this 8 dimensional reality the *Akashic Records*, which is described as a compendium of all universal events, thoughts, words, emotions, and intentions ever to have occurred in the past, present, or future. Here we have a Magic Crystal that is hypothesized as the source of all creation, past, and future and also happens to also be 8 dimensions. This is mentioned not to lend or remove any validity to these various models of reality but to show how similar conceptual patterns are expressed via different philosophies and perspectives; scientific, mathematical, meta-physical, or mystical. I also mention him here because his explanation of reality is entirely compatible with the Tholonic model, albeit less technically detailed but more complex, so for those more meta-physically aligned, his perspective may be valuable.↩

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ויאמר אלהים אל משה אהיה אשר אהיה ויאמר כה תאמר לבני ישראל אהיה שלחני אליכם ↩

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Janibekov effect is when an asymmetrical rigid body, like a wing-nut or a handle, rotating around one of its axis, suddenly flips 180°, and continues to rotate around the same axis but in a reverse position. After a few moments, it flips again and continues flipping back and forth indefinitely. It does this because the lowest energy state, which is the state that all matter seeks, requires the maximum amount of inertia, and the maximum amount of inertia will always be where the most mass is. Given that the object is asymmetrical, the amount of mass for each axis will change, causing the object to change position. A quick search for "Janibekov effect" will yield many fascinating videos on this phenomenon and shows how energy operates in form and, presumably, in the archetypes of form, given are tholons and tholons are asymmetrical.↩

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346. Murthy, S. S. N., "Number Symbolism in the Vedas", Electronic Journal of Vedic Studies, Vol.12 No. 3, 2005, ISSN 1084-7561, http://dx.doi.org/10.11588/ejvs.2005.3.396↩

347. **"Ask Evolution: Why Do We Have Five Fingers?"** Topics. Accessed July 9, 2022. https://www.sbs.com.au/topics/science/humans/article/2016/08/01/ask-evolution-why-do-we-have-five-fingers.↩

348. These tests are: monobit frequency test, block frequency test, runs test, longest run ones10000, binary matrix rank test, spectral test, non-overlapping template matching test, overlapping template matching test, Maurers universal statistic test, linear complexity test, serial test, approximate entropy test, cumulative sums test, random excursions test, random excursions variant test, cumulative sums test reverse. These tests are provided by the National Institute of Standards and Technology as implemented by the program *testrandom.py* by Ilja Gerhardt, https://gerhardt.ch/random.php. The numbers published here are the result of the program "ent", a pseudo-random number sequence test program by John Walker of Fourmilab Switzerland, https://en.wikipedia.org/wiki/John_Walker_(programmer)↩

349. Data generated with the command "ent" with the following variables: Is Intel CPU; AESNI Supported in instruction set; Format=Hex model=pure size = 1000 kilobytes XOR mode off XOR range mode; off Output to file x Hardware Random Seeding on. Non deterministic mode; Reseed c_max=511; Using RdRand as nondeterministic source; Total Entropy = 0.000000; Per bit Entropy = 0.000000 %↩

350. Stevens, M. (2015, September 15). **The Zipf Mystery**. Retrieved June 30, 2020, from https://www.youtube.com/watch?v=fCn8zs912OE. The page of this video has dozens of excellent related links↩

351. https://solvemymath.com/online_math_calculator/number_theory/riemann_function/index.php or https://keisan.casio.com/exec/system/1180573439, for example.↩

352. Snehal Shekatkar, **The sum of the rth roots of first n natural numbers and new formula for factorial**, 2012, arXiv:1204.0877v2 [math.NT], https://arxiv.org/abs/1204.0877v2↩

353. Saad-Cook, J., Ross, C., Holt, N., & Turrell, J. (1988). "**Touching the Sky: Artworks using Natural Phenomena, Earth, Sky and Connections to Astronomy**". *Leonardo 21*(2), 123-134. https://www.muse.jhu.edu/article/600628. Charles Ross, the creator, describes: "1972. I had placed this simple lens set-up on the roof so the sun would burn a path across a wooden plank as the day progressed. The idea was to collect a portrait of the weather each day. As the work progressed, I noticed that the burn's curvature was changing with the seasons. We took photos of the burns and placed them end to end following their curvature to see what a year's worth looked like. The sum of days generated a double spiral figure. At first, it did not make any sense-this primitive lens set-up was producing a complex spiral shape. A few of the astronomers I showed it to said, "Well, it must be coming from somewhere, but we have no idea what it is". Most of the scientists insisted that there had to be some anomaly in the set-up and that the shape had nothing to do with astronomy -just some weirdness in the lens. In reality, it made no difference at all if the lens faced one way or the other as long as it faced generally toward south. The elements of the spiral are in sunlight itself; it was an archetypal image falling from the sky. I finally contacted Kenneth Franklin at the Hayden Planetarium. He directed me to the Naval Observatory, where LeRoy Doggett, an astronomer with the Nautical Almanac office…". Authors note: This Sun Spiral was pieced together manually from many separate samples and is an approximation of the Sun's path.↩

354. Nishiyama, Yutaka. "**A Study of Odd- and Even-Number Cultures.**" *Bulletin of Science, Technology & Society* 26, no. 6 (2006): 479-84. doi:10.1177/0270467606295408.↩

355. The use of magnetic water in agriculture to increase harvest and save up to 25% water. Live testimonials by the biggest Australian farmers. https://www.youtube.com/watch?v=YVL6tfGhr8M↩

356. For example. **Heron's Fountain Plastic Water Bottle 2 minute DIY no sealant, no glue,**https://www.youtube.com/watch?v=92rSXLPupKw↩

357. More on Victor's work can be seen in the excellent documentary on YouTube "**The Secrets of Water, The Documentary of Viktor Schauberger / Comprehend and Copy Nature**", https://www.youtube.com/watch?v=XyOGdjWDVM4↩

358. Martin-Fischer-Harthun, "**Experimente mit Leitungswasser**", 1997. This paper is difficult to find online. The original can be purchased at https://www.fischer-wirbelwasser.de/shop/buecher.html↩

359. Martin.chaplin@btinternet.com, Martin Chaplin: "**Hydrogen bonding in water**". Accessed December 8, 2022. http://water.lsbu.ac.uk/water/water_hydrogen_bonding.html.↩

360. Jared L. Manley, James Thurber. "Where Are They Now?" The New Yorker. The New Yorker, August 7, 1937. https://www.newyorker.com/magazine/1937/08/14/where-are-they-now-5.↩

361. https://archives.newyorker.com/newyorker/1937-08-14/flipbook/022↩

362. Xing Xiu-San, ""Spontaneous entropy decrease and its statistical formula", Department of Physics,Beijing Institute of Technology,Beijing ,China; https://arxiv.org/pdf/0710.4624.pdf↩

363. Anderson, J. S. c. 2. J. (2017). "**El, Yahweh, and Elohim: The Evolution of God in Israel and its Theological Implications**". The expository times, 128 (6), 261-267. doi:10.1177/0014524616672624↩

364. Additional material supplied by Mauro Biglino, author on 19 books on the Old testament, and Paul Wallis, a theological educator, Archdeacon in the Anglican Church in Australia, and a best selling researcher on the Bible.↩

365. Peterson, E. H. (1972). "**Baalism and Yahwism Updated**". *Theology Today*, *29*(2), 138–143. https://doi.org/10.1177/004057367202900202↩

366. The full quote is "Dubito, ergo sum, vel, quod idem est, cogito, ergo sum" ("I doubt, therefore I am, or what is the same, I think, therefore I am"), which was later shortened to "*Dubito, ergo cogito, ergo sum* ("I doubt, therefore I think, therefore I am"). Does this qualify Descartes as the father of Critical Theory?↩

367. American Psychological Association, Dictionary of Psychology, https://dictionary.apa.org/self↩

368. Watson JB. Psychology as the behaviorist views it. *Psychological Review.* 1913;20(2):158-177. doi:10.1037/h0074428↩